Engineering Library

GENERAL LIBRARY
MAY 1 1919
UNIV. OF MICH.

MOTOR AGE

Volume XXXV
Number 17

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, APRIL 24, 1919

Fifteen Cents a Copy
Three Dollars a Year

The Essex Sells Itself

Sure Future for New Type Car

Its Position Assured

This is not a boast. These are the very words of one of our largest distributors. The crowds the Essex has drawn wherever it has been shown, the praise it has received from motorists, engineers and the newspapers forecasted great sales.

But we were not prepared for the wholesale sweep the Essex made. Reports from distributors and dealers everywhere indicate that their allotments have been oversold. Telegrams clamoring for larger allotments have been pouring in daily. Essex dealers and distributors have been kept swamped with business. And the Essex is only a few months old.

Backed by an organization that is the recognized leader in the manufacture of fine cars and handling a car whose qualities have made it self-advertising as well as self-selling Essex dealers are not only making large profits but building a sure future.

Essex sales are easy. There is no doubt about that. The Essex meets a transportation need not met by any other car. It is light, yet it has all the comforts of the large costly car. It is low in first cost and low in upkeep costs. The Essex has beauty and lasting quality. Its popularity is already assured.

ESSEX MOTORS DETROIT USA

We have room for a few dealers of the highest type—men who are leaders in their line. If you are a leader, get in touch with us at once.

Entered as second-class matter Sept. 19, 1899, at the post-office at Chicago, Ill., under act of March 3, 1879

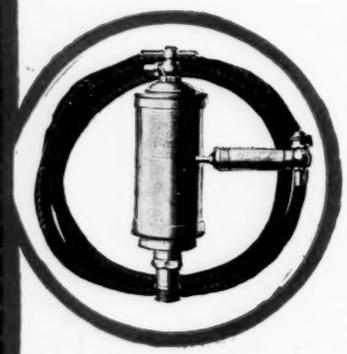
THE Hill Pump Valve Co

UTILITY

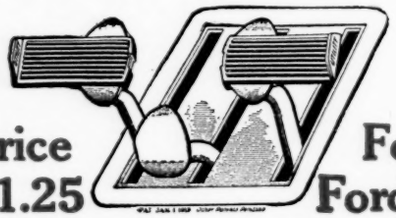
CHICAGO, U.S.A.

AUTOMOTIVE PRODUCTS

Have A Year-'Round Merchandising Appeal That Pays



UTILITY PUMPS
For All Cars - $12.00
For Fords - - 7.50



Price $1.25 For Fords

UTILITY Pedals
Are Going Big Right Now

The biggest drawing card among Utility Automotive Products for **immediate sales**, and spring and summer delivery, is **Utility Pedals for Fords.**

There is no guess work about Utility Pedal sales. They move fast through your stock —the **absolutely necessary** accessory for Fords.

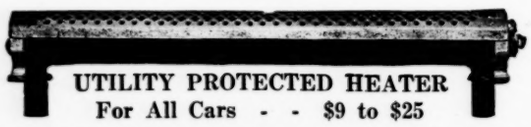
Dealers: Order through your jobber.

Jobbers: Get in touch with us.

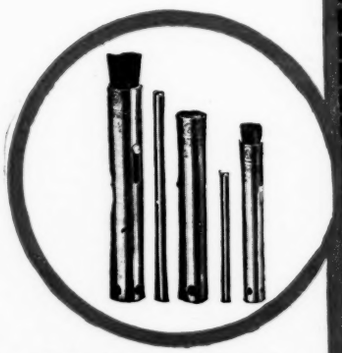
Hill Pump Valve Company
Mfrs. of UTILITY Products
Archer Avenue and Canal St., Chicago
Sales Department:
THE ZINKE CO., 1323 S. Michigan Av., Chicago

UTILITY RIM WRENCH
For All Cars - $1.75

UTILITY DISAPPEARING TRUCK BODY
For Fords - $38.50



UTILITY PROTECTED HEATER
For All Cars - - $9 to $25



UTILITY UNIVERSAL WRENCH
For All Cars - $3.50

MOTOR AGE

Published Every Thursday by

THE CLASS JOURNAL COMPANY

MALLERS BUILDING
59 E. Madison St., CHICAGO

HORACE M. SWETLAND, *Pres.* W. I. RALPH, *Vice-Pres.*
E. M. COREY, *Treas.* A. B. SWETLAND, *Gen. Mgr.*

Member Audit Bureau of Circulations; Member Assoc. Business Papers, Inc.

Vol. XXXV Chicago, April 24, 1919 No. 17

CONTENTS

Copyright 1919 by THE CLASS JOURNAL COMPANY

Repairs by Parcel Post..... 7
Supply and Demand in Cars..... 12
Editorial 14
Entries for Indianapolis..... 16
Chicago-New York Flight..... 17
N. A. D. A. Plans..... 18
Southern Dealers Must Organize.... 20
Service that Satisfies..... 24
Getting on Cash Basis..... 28
Electrical Equipment 30
Tractor Specifications 40
Development 46

Reo Speed-Wagon Attachments, Oldfield Tire and Columbia 1-Ton Truck Described and Illustrated.

DEPARTMENTS

Motor Car Repair Shop..... 37
Readers' Clearing House..... 32
Wiring Diagram Chart..... 44
Maintenance Data Sheet..... 45
Accessory Corner 48
Service Equipment 49
Among the Makers and Dealers..... 50
From the Four Winds..... 52

Advertisers' Index—Next to Last Page

MOTOR AGE

MALLERS BUILDING Phone Randolph 6960
CHICAGO Cable Address "Motage"

E. E. HAIGHT, Manager
DAVID BEECROFT, Directing Editor DARWIN S. HATCH, Managing Editor

BRANCH OFFICES

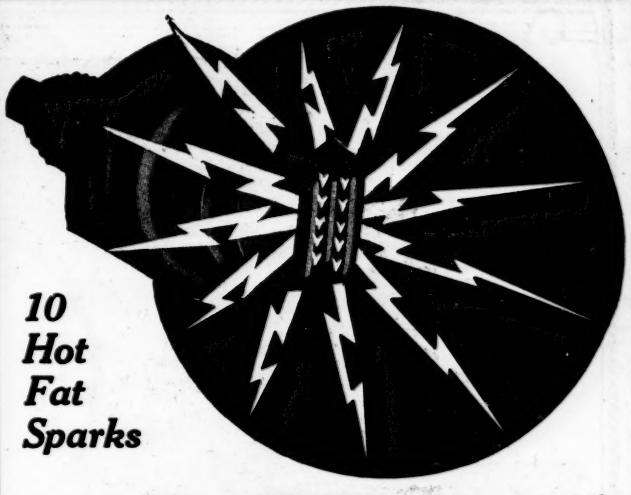
DETROIT, 95 Fort St., W. Phone Main 1351
CLEVELAND, 536-540 Guardian Bldg. Phone Main 1142
NEW YORK CITY, U. P. C. Bldg., 239 W. 39th St. Phone Bryant 8760
PHILADELPHIA, Widener Bldg., Phone Walnut 5601

SUBSCRIPTION RATES

United States, Mexico and U. S. Possessions..$3.00 per year
Canada ..... 5.00 per year
All Other Countries in Postal Union..... 6.00 per year
Single Copies .....15 cents

Entered as second-class matter, September 19, 1899, at the Post Office, Chicago, Illinois, under Act of March 3, 1879.

Owned by UNITED PUBLISHERS CORPORATION, 243 W. 39th St., New York, H. M. Swetland, Pres.; Charles S. Phillips, Vice-Pres.; W. H. Taylor, Treas.; A. C. Pearson, Secretary.



10 Hot Fat Sparks

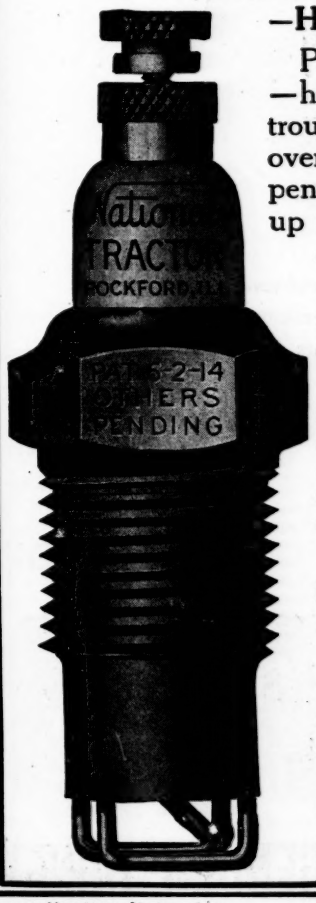
National

BIG POWER SPARK PLUGS

are equipped with big "Spark Power," oversize electrodes of extra heavy wire—designed specially to ignite low grade oils that have a tendency to slow, lazy ignition. They will not fuse or warp.

Tractor Special

—Heavy Stone Insulator



Practically unbreakable—heat proof—oil proof—trouble proof. A sturdy-oversize, big power, dependable plug that stands up under heavy duty requirements, and is unequaled for steady service and economy of fuel.

Made in all sizes—to fit any motor, for air, land and water service. Every one is carefully inspected, rigidly tested and fully guaranteed.

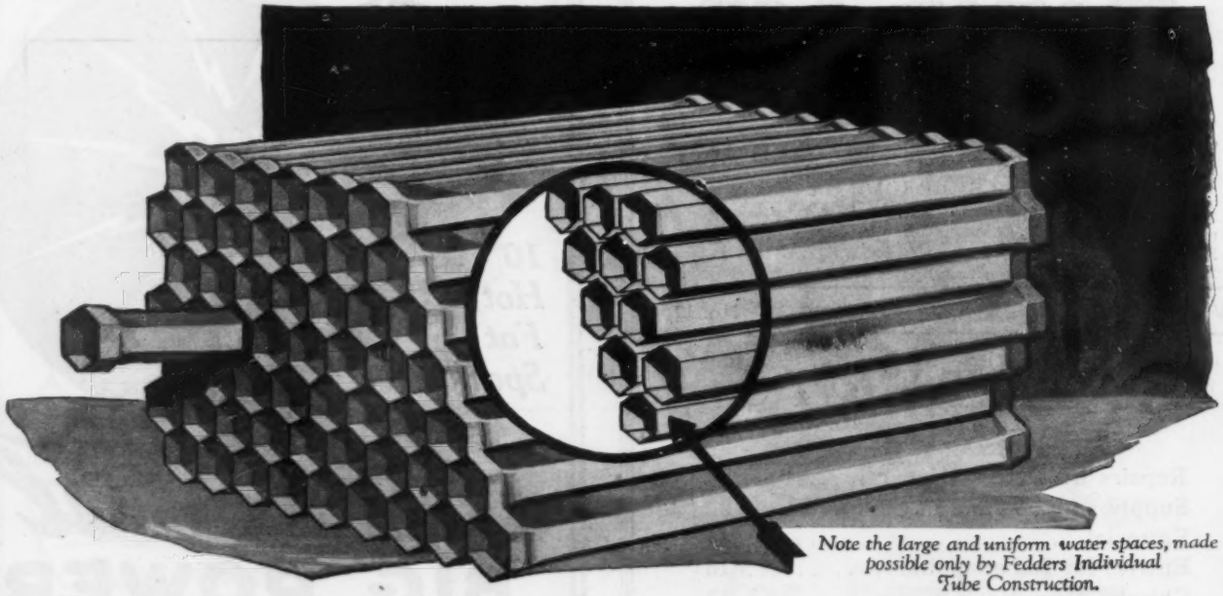
Prices (in U. S. A.)
Standard Plugs - $1.00 Each
Tractor Special - 2.00 Each
Sold by All Reliable Dealers

Catalog of Sizes Mailed to Dealers on Request.

BERGIE NATIONAL SPARK PLUG CO.
311 E. State St., Rockford, Ill.

New York Pittsburgh Atlanta
San Francisco Dallas

Export Dept., Werner & Butts
336 Whitehall Bldg., New York, U. S. A.



Note the large and uniform water spaces, made possible only by Fedders Individual Tube Construction.

Durability

Durability **is just one of several Fedders features—ask us about the others.**

EACH of the Individual Cellular Tubes which form the core of this Radiator is dipped in a special high grade solder compound. This prevents leakage due to porous brass or corrosion.

This radiator is extremely flexible and shock-resisting because each tube is firmly attached to the adjoining ones by six *flat surfaces* at its expanded ends, instead of merely thin line edges or points as with hexagon or cellular "ribbon" types that resemble this in outward appearance.

It will best withstand freezing because the water is everywhere in contact with flexible metal surfaces.

Durability is another one of the reasons why the U. S. Government specified that this type only, must be used hereafter on its aeroplanes--the severest of all radiator service.

Furnished in any width or heighth, and with a depth of from two to four inches.

FEDDERS MFG. CO., INC., Buffalo, N. Y.

FEDDERS

GENUINE HONEYCOMB RADIATORS

Let Uncle Sam Help You

You've heard the story of the fellow who started one of the most gigantic mail order businesses through selling watches. This chap evidently placed a lot of faith in one of Uncle Sam's great institutions—the U. S. Post Office. His success was perhaps due to his foresight and consistent use of the mails for distribution and sales. You may not be interested in building up a mail order business, but you can't afford to overlook our postal system and learn how to apply it to your own business.

The lead story in this number of MOTOR AGE will give you some knowledge of how one progressive and wide-awake-service station is applying the Parcel Post to its business. Study their methods of "Repairs by Parcel Post" and learn how a good business may be built up in mail orders for repair parts.

Service Station Methods

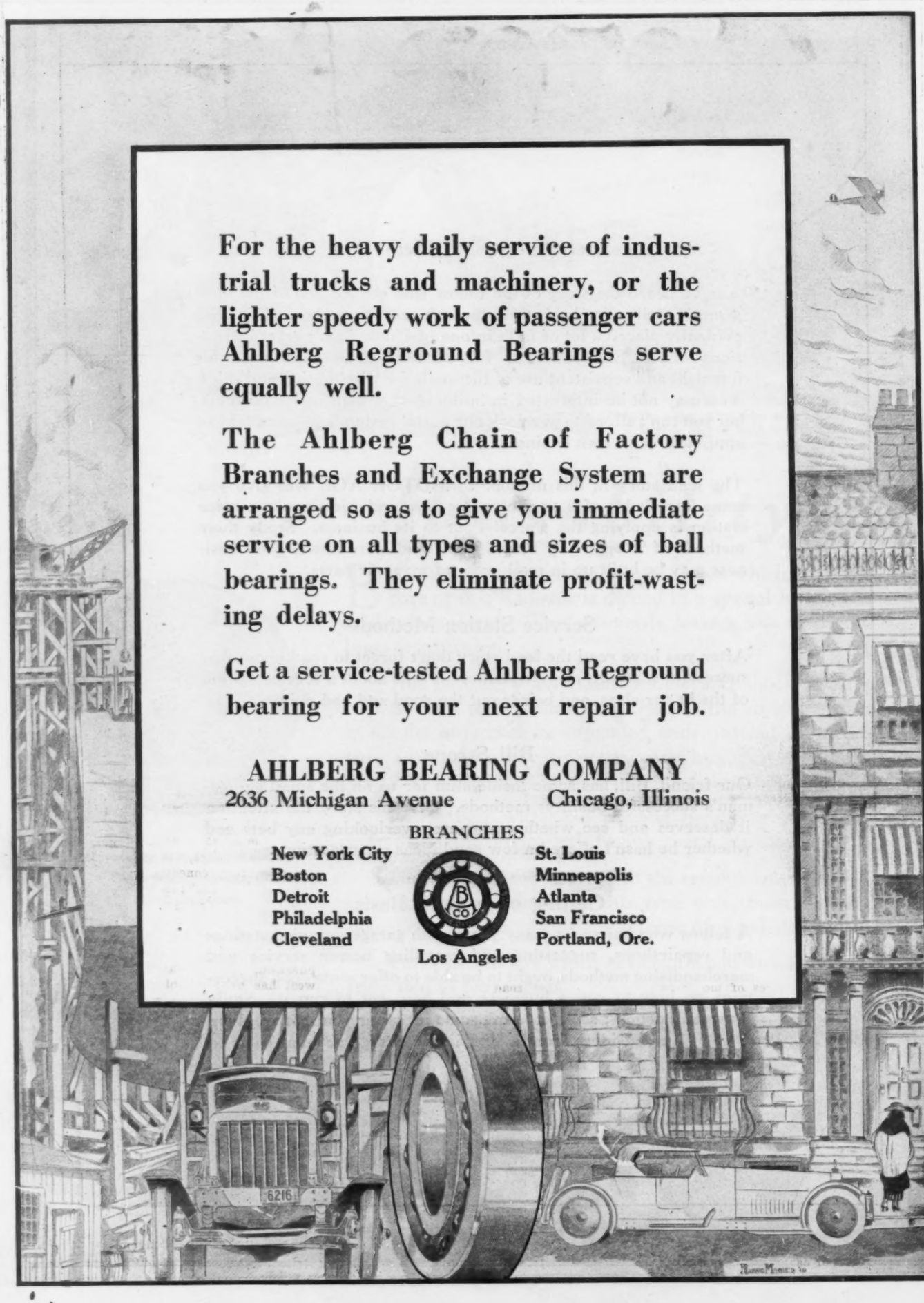
After you have read the lead story don't forget to read about that successful southern service station—it tells about a service station of the better class, and brings out the good and bad points.

Bill Strong

Our friend, Bill, has some inside stuff for us on the small garageman's successful business methods. Give his story the attention it deserves and see whether you are overlooking any bets and whether he hasn't offered a few good ideas or suggestions.

Getting on a Cash Basis

A fellow who has spent many years with garages, service stations and repairshops, suggesting and installing newer service and merchandising methods, ought to be able to offer some good suggestions on how to run a business and how *not* to run it. Study Bowman's article; see if it hasn't some ideas for you that will help change your business from a wearisome charge account basis to spot cash.



For the heavy daily service of industrial trucks and machinery, or the lighter speedy work of passenger cars Ahlberg Reground Bearings serve equally well.

The Ahlberg Chain of Factory Branches and Exchange System are arranged so as to give you immediate service on all types and sizes of ball bearings. They eliminate profit-wasting delays.

Get a service-tested Ahlberg Reground bearing for your next repair job.

AHLBERG BEARING COMPANY
2636 Michigan Avenue Chicago, Illinois

BRANCHES

New York City
Boston
Detroit
Philadelphia
Cleveland
Los Angeles
St. Louis
Minneapolis
Atlanta
San Francisco
Portland, Ore.

Vol. XXXV, No. 17 Chicago, April 24, 1919 $3.00 Per Year

MOTOR AGE

REPAIRS *by* Parcel Post

By Fred M. Loomis
Motor Age Editorial Staff

More than 21,000 repair jobs were handled by the concern housed in this building during 1918. Parcel post carried them from owner to shop and back again

MORE than 21,000 pieces of motor car electrical equipment came for repair to the shop of the Reinhard Brothers Co., Inc., by parcel post, express and freight during the last twelve months, were repaired and returned the same way. These units came from dealers and garagemen from all over Minnesota, North and South Dakota, Montana, northern Wisconsin, northern Wyoming and northern Iowa. Throughout this vast stretch of territory the dealers have been educated to the knowledge that the Reinhard company can and will, promptly and efficiently, repair any piece of electrical equipment which goes on a motor car.

Primarily the Reinhard company is a wholesaler of motor car accessories and garage equipment. More than a score of salesmen travel the road in the Northwest and the company has become one of the best known and the strongest of accessory houses. Parallel with the growth of the concern as an accessory house, however, has been its development as a repair house for electrical equipment for motor cars. The growth of this department of the business has been phenomenal and the shop which employed only about twelve men regularly a year ago now keeps fifty men busy, and David D. Onan, who has charge of this department, says he expects to double that number by the end of the present year. At the present time from 100 to 125 repair jobs go through the shop every working day.

From the point of view of dollars and cents the electrical repair department of the Reinhard company represents but a small percentage of the total annual business. However, in relative importance this department is all out of proportion to its money value. Through it in all probability the company comes into more intimate relationship with dealers and with garagemen throughout the Northwest than it does through any other department of its business.

Repairs a Profession

Mr. Onan is possessed with the idea that motor car repairing is a distinct business or profession and that it is by no means the least important of the vocations that have grown up within the automotive industry. His theory is that the specially trained repairman, who gives prompt and efficient service, is an all-important factor in the automotive trade who has not yet received his due measure of recognition. He determined, therefore, insofar as Reinhard Brothers were concerned, there should be no manner of doubt in the mind of anyone. From the very first, in shop equipment, skill of mechanics, efficiency and precision of work and promptness of service, the importance of the repair industry has been emphasized, until now all through the Northwest has been established the conviction that if anything goes wrong with the electrical equipment on a motor car a sure cure can be found in the Reinhard shop in Minneapolis and all it is necessary to do is to send the unit there for repair. The result is that thousands of pieces of equipment are sent to the company every year, and the reputation and business of the concern are growing by leaps and bounds.

The repairshop, and the stock of necessary new parts, occupy the fourth floor of the Reinhard building. The shop proper is in the front and the stockrooms are in the rear. The growth of the business, both in the accessory and repair lines, is crowding the company, and arrangements now are being made either to add four stories to the present structure or to build a unit of equal

David D. Onan and his force in the shop office keep track of the jobs as they come and go

Electrical equipment from half a dozen states comes to the Reinhard establishment for treatment

Jobs come to this rack from the receiving department and are handled in their turn

The sample and showroom of Reinhard Brothers Co., Inc., which handles 21,000 repair jobs a year

They use some anti-skid chains in the Northwest, as shown above. At the right is part of the racks in the accessory department, where thousands of parts are kept

size on vacant land adjoining. The proposed addition will not only double the available floor space but it will multiply many times the facilities of the company for doing business.

Mr. Onan has original ideas as respects both the equipment of his shop and the men who will use that equipment. The former is largely specialized, designed by him to perform just the operations for which it is intended. The men, for the most part have been trained to their present proficiency under his supervision. Thus equipment and men supplement each other in the attainment of a degree of efficiency rarely found. He believes in making specialists out of his men. Singular as it may seem in a shop like this, out of the present force of fifty mechanics only one was originally a motor car repairman. The force has been recruited from all directions, mostly mechanical, it is true, but men who were working as telephone men, wheelwrights, plumbers and mechanics from other lines have been inducted into the Reinhard shop and each, by having his special mechanical aptitude directed, has become skilled along one or more of the many lines necessary in such establishment.

Trains Own Men

Also by training his own men and by adopting a rational and satisfactory way of handling them, Mr. Onan was enabled to operate his shop last year with a labor turnover of only 1 per cent. This, of course, takes no account of the men who went into the Government service.

Among adaptations of common apparatus may be mentioned the ovens for baking coils. These are just ordinary gasoline stove ovens, but here set on a gas stand under a hood which catches all the smoke and smells. Another adaptation is that of a burnishing and polishing machine to be found in most shoe repairshops nowadays. This carries emery wheels, grinding and polishing wheels, burnishing wheels and cleaning brushes and is used by every man in the shop in putting the finishing touches to whatever job he may be working upon. So much attention is paid to the detail of finishing a job that the repaired units when they are ready to go out of the shop are indistinguishable from new units.

An unusual piece of original apparatus is the cleaning stand. This is a metal table, some 4 ft. square, with the outer edge of the top turned upward in a flange. In the center of the table are inserted two longitudinal tanks, back to back, and each covered with a hinged lid. These tanks contain gasoline, 5 gal. being sufficient for a day's run. Every piece of equipment entering the shop is thoroughly cleaned at this table, the arrangement being such that two men may work at the same time.

Other specially designed equipment is the table for remagnetizing magneto magnets and the test racks for testing magnetos and electrical generators. These racks are adjustable for any size magneto or generator and run so smoothly and noiselessly that the operator can detect by ear anything wrong in the running of the unit undergoing test. There is a battery of such machines, and every job is given a thorough test on them before it is permitted to leave the shop.

Every workman has an individual bench, lighted by a big individual window and provided with ample facilities for artificial light when the latter is necessary. Also each bench is provided with all the necessary electrical wiring and connections for testing jobs while undergoing repair.

A clever idea is the dissembly of all units in seamless iron pans. This keeps every part of the unit, large and small, in one receptacle until re-assembly, prevents the loss or interchange of parts and facilitates the work.

A distinctive feature of the Reinhard shop equipment is its portability. With the exception of some of the lighter equipment in the machine shop, everything may be moved at will. This has been a big advantage in rearranging the shop from time to time to accommodate the growth of the business.

The machine shop is small but well equipped, and the machines have been selected to meet the peculiar needs of the institution. There are lathes, drill presses, punching presses, welding apparatus and all the other small adjuncts to a well equipped shop.

The toolroom is located practically in the center of the shop as the latter now is laid out. As tools are issued to a man he turns in an identification check which is retained in the toolroom until he returns the tool or otherwise accounts for it.

As the units for repair come up from the receiving room they are placed in numbered compartments in a series of racks located near the center of the shop. They are taken from these racks in order, for the rule of the shop is, "First come, first served." The compartments are numbered one way and lettered another. This combination is entered on the job ticket and any unit may be located instantly.

Always there are hundreds of jobs awaiting attention. From 100 to 125 repair jobs are put through the shop daily, but a never-ending stream of new ones pours in. Every unit represents a car which is tied up somewhere, so that if all of the cars had to be accommodated instead of just the equipment, tremendous storage facilities would have to be provided.

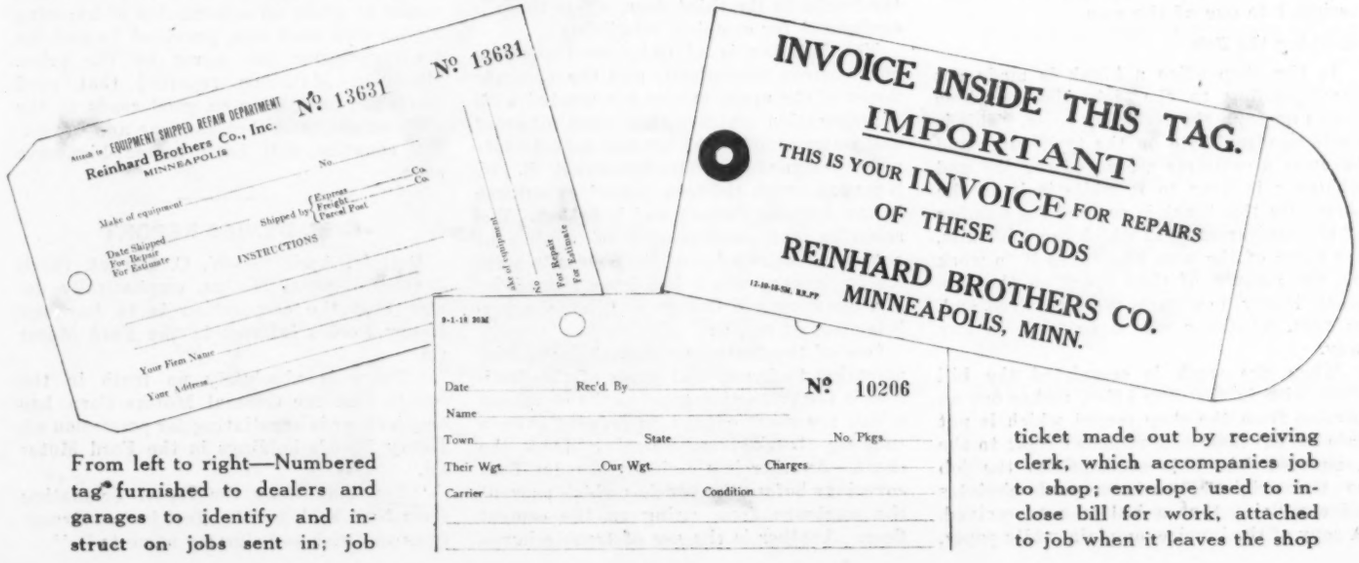
Where New Parts Are

The rear of the shop floor contains tier on tier of bins and trays in which new parts are kept. The normal market value of this stock of new parts runs from $50,000 to $60,000. Repair parts are carried for practically every used make of starting, lighting and igniting apparatus. The relative proportion of particular parts carried is determined by the number of repair jobs requiring such parts which may have come into the shop during a given time. In this way the repair stock is kept balanced and overstocking is avoided.

The bins and trays in this department are arranged in sections. Sections are designated by a letter and a number and the bin or tray by a number only. The stockman keeps a complete card index, a card for every tray or compartment of a tray. Thus, if the card says a certain part is to be found in Tray 15, Section A5, it can be located almost instantly.

In the armature section shallow cleats are nailed to the shelves so that the armatures will not suffer injury by rolling together. In fact, there are many handy little contrivances and notions around the shop and stockrooms, all of which contribute to the conservation of time, labor and material.

The company prides itself upon its claim that it can repair any piece of motor car electrical equipment, no matter how an-



From left to right—Numbered tag furnished to dealers and garages to identify and instruct on jobs sent in; job ticket made out by receiving clerk, which accompanies job to shop; envelope used to inclose bill for work, attached to job when it leaves the shop

cient or nearly obsolete that unit may be. To make good on this claim a very interesting department of the stockroom has been developed. This is where parts salvaged from old or obsolete equipment and from hundreds and hundreds of old magnetos the company has bought in are kept. It would be difficult to name a piece or a part, regardless of vintage, which may not be found in this department. Mr. Onan says there is valuable salvage on 90 per cent of the armatures, for instance, which come into the shop. This is saved by skilled mechanics; novices would not know its value and it would be thrown away.

Tags for Jobs

Every dealer and garageman served by the company in the Northwest receives a supply of tags, one of which is to be attached to any piece of equipment he sends in. One side of this tag gives a list of the apparatus which the company commonly includes in its repair scope. The other side provides for a brief description of the unit sent in, the date of shipment, the manner of shipment, instructions what to do with the unit and the name and address of the dealer or the garage. The right end of this tag is a detachable coupon, bearing a serial number corresponding with that on the tag. The consignor makes a record of his shipment on this coupon and detaches it for his own record. The serial number always identifies the particular unit in case correspondence ensues.

Whether carried by parcel post, express or freight, every shipment which comes in is taken in at the receiving department on the second floor of the plant. Here the receiving clerk detaches the tag which the dealer had put on and replaces it with a small, plain tag, on which is written the name and address of the shipper and on which also is stamped the serial number the job will bear while it is going through the shop. This tag also bears the date the job was received, and if required to be delivered at any specified time, this too is put on this tag.

The receiving clerk makes out also a shop record blank, identifying the unit, attaches to it any instructions which may have come with the shipment, attaches this to the job and sends it to the shop in a truck. Here it takes its place on the rack where incoming jobs are kept until it is assigend to one of the men.

Marking the Job

In the shop office a blank is made out corresponding to the job ticket which comes up from the receiving room. This is made quadruplicate on the typewriter and becomes a complete record of the job and whatever is done to it while it is in the shop. On this blank is entered the number of the compartment in which the job waits, the name of the man who takes it to work on, the amount of time spent on the job, what, if any, new parts were required and, in fact, whatever was done to it in any way.

When the work is completed the bill clerk, also in the shop office, makes out an invoice from the shop record which is put into an envelope and attached right to the completed job. This accompanies the job to the original consignor and obviates all complaint that a bill is not received. A copy of the invoice, on plain white paper, is sent at the same time to the credit department through a pneumatic tube. There it is determined whether the shipment shall go on open account or shall be a C. O. D. The credit department makes the proper notation on its copy and sends it to the shipping department through another tube.

In the meantime the repaired unit has been put into a tray, shot down a chute to the packing room, thence through another chute to the shipping room. By the time it arrives there the shipping clerk has received his instructions from the credit department, and the completed job starts on its way home.

Considering the great number of jobs which come to the shop and the amount of work it is necessary to do on many of them, the celerity with which the work is done is remarkable. For the most part this is due to the skill of the mechanics employed and to the admirable system for handling the work. Almost it may be said that a job never stops from the time it comes in to the Reinhard plant until it starts on its return journey. It is this promptness of service and the dependable quality of it that have built up the enviable reputation the company enjoys in this field of service.

SERVICE FOR 700 TRUCKS

Chicago, April 17—The newest of the large establishments in Chicago, combining truck sales and service, is the new factory branch building of the Autocar Co. This is a three-story building, especially designed for this service, and gives 63 000 sq. ft. of floor space. Provision is made for two additional floors when demanded.

The first floor is taken up with a showroom, executive offices and a garage. On the second floor is storage space which enables the Autocar Co. to keep a large stock of trucks to assure quick delivery. The machine shop, repair plant, blacksmith shop and parts department on the top floor is lighted by skylights and makes an ideal service plant.

Inasmuch as service after sales is one of the strong points of Autocar policy, the while layout has been arranged to give quick and efficient service. The trucks come into the first floor for preliminary inspection and minor adjustment, and when more work is required two elevators carry the trucks to the third floor, where there is equipment for complete rebuilding.

The building is of re-inforced concrete construction throughout, and the concrete floors of the upper stories are treated with a preparation which makes them oil-proof and water-proof. The service departments were designed by Superintendent R. W. Simmons, with thirteen years' experience in the Autocar factory and branches. The selection and arrangement of equipment reflect the knowledge of the needs for service in trucks, which has been gained by Mr. Simmons and George E. Ritchie, superintendent of repairs.

One of the features which shows special attention to the special needs of this business is the protective gates to the elevators, which are stout enough to prevent even a runaway truck from plunging down the shaft. Another is a series of wooden floor coverings before the benches which prevent the workmen from tiring on the cement floor. Another is the use of trouble lamps on reels, which are saving several times their cost in replacements of lamp cords and electricians' time.

The equipment of the service department includes special apparatus for testing and re-charging magnetos, two machine lathes, a big arbor press, a hand miller for the keyseating, as well as a power forge.

Many Autocar users operating the 700 trucks within a radius of 50 miles of the station have fleets of twenty or more and maintain their own service stations, but the majority of these trucks are serviced by this plant. It is located centrally ,but outside of the loop district, and can be reached without passing through congested thoroughfares. It is expected this will be the master station of a series in different parts of the city when the business demands it, but the present plant has a capacity of several times the immediate needs. The whole plant is under the direction of H. M. Shepler.

WILKES-BARRE DEALERS MEET

Wilkes-Barre, Pa., April 18—N. L. Tooker, field secretary of the National Automobile Dealers' Association, participated in a meeting yesterday noon of the Wilkes-Barre Automobile Dealers' Association at the Reddington Hotel. The association has under way plans for an increased membership and plans a more active participation in the affairs of the N. A. D. A.

Mr. Tooker's visit may result in the extension to N. A. D. A. members generally of the benefits of a collection bureau for handling bad accounts. He will report to General Manager Harry G. Moock, St. Louis, a plan which Wilkes-Barre dealers used with considerable success.

This plan was sold to the dealers by a collection agency in Philadelphia, which supplied blanks of a series of four form letters, bearing the name of the collection bureau. These forms were mailed out by the dealers to deadbeats and the results were surprising. In case the letters failed the agency collected, or tried to, on a 10 per cent basis.

The meeting was addressed by Mr. Tooker; Peter G. Rimmer, president of the Wilkes-Barre Automobile Club, and President Frank Matheson of the dealers' association. The dealers discussed a used car co-operative plan whereby every dealer would be given an opportunity of handling all his own used cars, provided he and the trading dealer can agree on the price. President Matheson reported that good work has been done on good roads at the state capital and that Luzerne and Wyoming counties will have better highways soon.

G. M. DENIES REPORT

Detroit, April 21—W. C. Durant, president of General Motors, emphatically denies that the corporation is to buy out Henry Ford's interest in the Ford Motor Co.

"There is absolutely no truth in the report that the General Motors Corp. has acquired, or is negotiating for possession of, Henry Ford's holdings in the Ford Motor Co.

"You may deny the report emanating from New York to this effect just as strongly as you wish and sign my name to it."

$152,000,000 for Roads in France

Most of This Will Be Used in Devastated Regions

PARIS, March 25—By mail—The French government has voted $152,000,000 for the repair and upkeep of roads. Of this amount $112,000,000 will be devoted to the repair of roads in the devastated regions of France. Forty million dollars are to be spent on the repair of roads which suffered indirectly in the war. These include roads which owing to military activities have had to carry an amount of traffic for which they were never designed.

The careful examination of the roads situation in France shows that 65,000 miles of main roads in the war area must be entirely rebuilt. In addition several hundred bridges which at present are of a temporary nature must be reconstructed. It is estimated that to put these war-stricken roads into proper condition, 10,400,000 tons of material will be required. The estimated cost of this work is $64,000,000. This is in addition to that spent by the military authorities during the war for the maintenance of roads in the war area.

For the last four years all the roads in the war zone of France have been under the direct control of the army authorities. At the end of April this control will be taken away from the army and invested in the Ministry of Public Works, which will occupy itself not only with the main or national highways but also with the local or departmental roads. In the past the state only maintained national roads, leaving the upkeep of the secondary roads to the local authorities. In view of the enormous task facing it, this divided control has been abolished. All the gravel pits and stone quarries at present worked by the military authorities will be taken over by the Ministry of Public Works. Also all road work which is now handled by the American and British armies will be transferred to the French civilian authorities. Many of the contracts for this big scheme have been placed, and it is believed active work on the repair of roads will begin by the end of April.

The second part of the program, which deals with the repair and improvement of roads outside the war zone, is almost as big as the first. In asking for, and obtaining, a credit of $40,000,000 the French authorities realized that a tremendous effort must be made to make the roads equal to their condition of ten years ago. A technical committee has been appointed to determine the kind of material necessary for each type of road. It is probable also that there will be a reclassification of roads. Since the development of the car many roads which in years past were classified as fourth or fifth grade have become of primary importance from the standpoint of the user. These roads should have spent on them an amount of money commensurate with the traffic they have to carry. Under this scheme it is estimated that it will be necessary to furnish immediately 5,000,000 sq. yd. of broken stone and to repair more than 1,000,000 sq. yd. of granite-paved road.

INDIANA HIGHWAY COMMISSION

Indianapolis, Ind., April 19—Organization of the new Indiana state highway commission was effected this week with the election of David C. Jenkins, Kokomo, the only member of the commission who was on the old commission before the enactment of the 1919 law, as chairman. Other members of the commission are Arch Campbell, Kendallville; Earl Crawford, Connersville; and John T. Oliphant, Vincennes. L. H. Wright, chairman of the old commission, was selected as director of the new body and his salary fixed at $4,000 a year. Mrs. Helen Freeman was appointed auditor.

Immediate organization of the 1919 highway building program is provided for in plans for meetings next week, when the commission also will select an engineer to have charge of road improvements. Within thirty days after the organization is completed it is expected to let bids for the first work on more than 100 miles of permanent highway improvement it is intended to complete this year.

KANSAS PAVING SANTA FE

Kansas City, Mo., April 19—More than half of the total mileage of the Santa Fe trail across Kansas may be paved this year, and practically the entire mileage across the state is in process of authorization. Only five counties traversed by the highway have failed to make any movement toward improving the roads, which are used by more transcontinental tourists than any other highway in the state. Already 258½ miles of hard-surfaced roads of the highway have been petitioned for and approved by the county commissioners and the state highway commission and will be ready for contract as soon as the plans are completed.

Petitions have been circulated, some only awaiting the approval of the county commissioners, for the improvement of 156 additional miles. This leaves only 98 miles where no action has been taken. Douglas county already has advertised for bids on 19 miles of the road, and plans are being made to have the work start not later than June 1. Estimates place the cost of this road at $570,000.

CONTRACTING FOR ROAD WORK

Washington, April 18—For the week ended April 12 Pennsylvania ordered highway construction totaling $2,034,378. This is the largest amount of road work contracted for in any one week by any state and is regarded as an indication of the great amount of highway construction anticipated in the next few years. The government under the Federal Aid Road act will pay $911,407 of the Pennsylvania contracts. A bond issue of $50,000,000 for road building recently was authorized in Pennsylvania.

EXPLOSIVES FOR ROAD BUILDING

Washington, April 18—All surplus TNT and other explosives owned by the War Department and which can be used for building highways and other similar works have been turned over to the Department of the Interior.

How Texas Farmers Feel About Road Bonds

—Dallas, Tex., Morning News

Is There a Car Shortage?

Reports from Various Sections of Country Show Abnormal Demand Outstrips Production with Deliveries Unable to Catch Up with Sales

CHICAGO, April 18—If anybody wants to know whether the prospect cares what a car costs he has only to go down on the motor row, in Chicago territory at least, and he will get his answer. The price makes no difference. Those dealers who are getting all the cars they can deliver are the exceptions. And most of them will tell you the main question is: "When can I get delivery?"

In a nutshell the so-called car shortage is as follows: While at this time of the year the demand for cars is always heavy, this year the demand is exceptional. Normally the factories can take care of the heavy demand characteristic of this period. But this year, no. The factories as a whole have been slow in getting back on peace production, some of them are not yet anywhere near back, and as a result the supply is nowhere near the demand. This is taking all makes into consideration, of course. In the Chicago territory Franklin and Maxwell both state they are getting plenty of cars and are making deliveries righ along, even though business is unusually heavy. F. H. Sanders of Franklin says the factory also is able to take care of the small dealers.

Bright Days Draw Trade

Some idea of the excellent business in this territory is apparent in the mere appearance of the showrooms down the row on a bright afternoon, as to-day was. Chicago has been suffering from a period of rainy weather, and this is the first sunny day for some little time. It has brought the prospective car owners out in swarms. And those who have bought cars but cannot get delivery on account of the lack of cars from the factories—they are making things warm for the distributer, trying to get them.

When it gets to the pass that bad weather is a life-saver for a dealer, and especially in Chicago where bad weather abounds, you know something big is back of it. The last few days have been a life-saver, as George C. Norwood, vice-president of Thomas J. Hay, Inc., Chandler distributer, so aptly puts it. The requests, "When can I get delivery?" come so thick and fast on the good days it keeps a dealer busy trying to answer them. Not that there is a single Chicago dealer who would not like to be able to make delivery right away. Requests from customers are followed closely by requests to factories for more cars. The factories, as reports from Michigan and Ohio factories show, are hard pressed also. First windshields may be holding up a delivery to the Chicago dealer, then some other part and so on. It all dates back, to a more or less degree, to the materials situation, one is led to believe. Parts makers have been slow in buying, and in turn the car maker has been delayed in getting parts, as well as slow in getting back to commercial production.

The Chandler people are 175 cars short to-day. If they had them they could deliver them right off the bat, for they have the orders.

W. S. Mehaffey, vice-president of the Triangle Motor Sales Co., distributer of the Stephens and Scripps-Booth cars, says they are forty cars short on delivery of the Stephens and barely even on Scripps-Booth, though they could use more if they could get them.

"The small dealer is going to starve to death," says Mr. Mehaffey, who does not believe the small dealer as a class will be able to get cars to deliver. A lot of small dealers are coming back into the trade, however, all with the hope of getting some cars at least. Some of these are those who had to go out of business during the war for that same lack of cars; others are new altogether.

Charles E. Gregory of the James Levy Motor Corp. looks for a better supply by July, when he expects to see the different manufacturers bringing out 1920 models. Just now, however, he sees little hope for the small dealer. This concern is Buick distributer and wants 150 more cars right now itself. If it had seventy-five, says Mr. Gregory, it could deliver them between now and to-morrow night.

The best Kissel can promise the customer is delivery in three weeks. The Kissel Motor Car Co. is unloading about two carloads a week. The other day it got five carloads, but that was an exception. Of course, the Kissel factory is still on Government work, but it is expected here that it will be through in about three weeks and cars will be coming through better.

Wants Twice as Many

C. H. Foster, Cadillac Automobile Co. of Illinois, says he could sell twice as many cars if he had them. This holds good for the most part for the Chicago distributers in general. While all of them may not aim as high in their wishes as twice as many as they get, it is certain most of them would like an increase in their quota from the factory.

Maj. Harry Unwin, Reo, states his concern is way behind and has stopped taking orders on closed cars for delivery earlier than the middle of July.

Mitchell deliveries are 200 behind orders in Chicago, but it is expected cars will be received in sufficient quantities to clean up the deficiency by May 1. Naturally most of the orders are for the five-passenger but there are many closed cars. In fact, the percentage is larger in closed cars this year than it has been in the past.

E. C. Frady, local Cole distributer, has orders ahead which are awaiting delivery from the factory. A majority of the orders are for special painting and trimming jobs. In fact, it is stated that he could fill every order with a special painting or equipment job if conditions permitted.

Jordan has a few orders ahead but expects early shipments will take care of them.

Dodge Brothers could deliver tomorrow if it had them. It is taking no orders under one month delivery date. An exceptionally large percentage of requests are for closed cars.

Hudsons, Essexs and Dorts are sold way ahead according to Louis Geyler. On some models deliveries are six weeks behind the orders. Closed cars feature largely.

The Rue Motor Co., Ford, is eighty-five behind orders. The new closed models with electric starting and lighting are just beginning to come in.

Deliveries three weeks behind orders is the situation of the Chicago Nash distributer. Requests for closed bodies exceed all former years by a large percentage.

Milwaukee

MILWAUKEE, Wis., April 19—Every distributer and dealer is complaining over the fact that the supply of cars is far below the demand. Despite the fact that shipments from factories are rapidly reaching the average of pre-war days, orders are increasing at even a greater rate, and dealers today are from sixty to ninety days behind on their requirements.

A feature of the situation is the demand for closed cars, principally sedans, coupes and limousines, in the order named. In general, dealers believe they will not be able to catch up with orders this year. The call for the open cars is broad and pressing. Sentiment among dealers is that the demand will keep on increasing at an even faster rate than in the last month or two.

The Achen Motor Car Co., Chandler dealer, is from 140 to 150 cars behind on its orders. It is looking for improvement in the supply by reason of growing production at the factory but hardly expects to be caught up before July 1. Practically every closed car that will be available from now until Sept. 1 has been spoken for.

The Curtis Auto Co., Reo, is sixty days behind on orders and requirements are being placed at a rate that makes it appear conditions are getting worse instead of better in respect to supply and demand.

The Buick branch finds the demand far above its ability to supply cars. While deliveries to this branch are increasing from week to week, buyers are making reservation even faster and there never have been so many unfilled orders. Orders for used Buicks are from 50 to 75 per cent in excess of the supply. The demand for closed cars is the most remarkable in the experience of the local branch.

The Osmond Motor Car Co., Paige and Winton, is about seventy-five to eighty cars behind on orders for Paige and so far has not been able to catch up with orders for Winton.

The Milwaukee branch of the Packard Motor Car Co. of Chicago is far behind on its orders; in fact, it has not begun to fill orders accruing in the last thirty or sixty days, due to the large number of requirements placed between Dec. 1 and Feb. 1 before car production actually was resumed.

The Jesse A. Smith Auto Co., Hudson and Essex, accumulated a fair stock of cars last fall in anticipation of the cessation of production on Jan. 1, had the war continued, but even with this reserve it has not been able to cope with the demand.

The Ford assembling plant resumed work March 1 after being idle more than a year, and although it has already come close to the daily production of pre-war days, it is able to fill not more than half current orders.

The March Motors Co., Mitchell, despite its relatively favorable situation, 25 miles from the factory at Racine, is not in position to fill its orders, although men are dispatched to the factory immediately that a car becomes available for this field.

New York

NEW YORK, April 21—A canvass of the row indicates a considerable car shortage. Several dealers have ceased taking orders and others are two weeks to three months behind in deliveries. No sedans are available. A still greater shortage is expected within a few weeks.

Buick stopped taking orders three weeks ago and is now about a month behind. It reports an increasing demand for closed cars. C. T. Silver says he could sell 500 a month if he could get them.

Buffalo

BUFFALO, N. Y., April 19—Without exception Buffalo dealers report a shortage of cars and declare many more sales if cars were available for distribution. Briefly, the situation is this:

Ford—Shipments are not keeping up with orders, forty-six unfilled orders on books, prospects for shipments catching up with orders not bright, could easily sell more cars if delivered, prospects fine.

Hudson—Shortage of cars, considerably behind deliveries, prospects for catching up not very good, sales could be increased with more cars, looks like biggest year in company's history.

Overland—Shipments scanty, practically entire allotment sold or assured of sale, business very good.

Cadillac—Factory not keeping up with orders, shipments away behind, may catch up with orders by June, business very good.

Chevrolet—Shipments far behind orders, business outlook very promising.

Dodge—Shipments unequal to orders, more could be placed if available, business good.

Columbus

COLUMBUS, Ohio, April 19—The situation in Columbus and central Ohio is uniform in that there is a shortage of the closed cars. There is also a shortage, although not so marked, in the general line of touring cars and roadsters. All the agencies report a shortage on closed cars and are having all kinds of difficulty in getting shipments. All say they could sell many more if they could get deliveries.

The Dunkle-Overland Co. reports a marked shortage in sedans, coupes and all closed cars, as well as Knights and roadsters. In touring cars the company is getting enough to take care of the trade, but there is no oversupply. This company reports conditions excellent and indications are it will do two times the volume of business as in 1917.

The Capital Motor Car Co., Reo, reports a shortage in all models but more in closed cars. The last sedan in the allotment of the Columbus agency was received a month ago, and the last coupe is now on the way. The demand for cars is extra good, and many more could be sold if factory deliveries could be secured.

The Columbus Ford branch is in about the same position. There is a marked shortage in all models but especially in closed cars. Sales would be heavier if deliveries could be secured or rather insured, as it is an assembling plant.

The Oscar Lear Motor Co., Buick, is another concern which reports a marked shortage in shipments. There is a shortage in all models, but especially in closed cars, which have been sold for several months ahead. All cars are sold throughout May. It is believed the demand is much heavier than in any previous year, and the volume of business is restricted only by the lack of deliveries.

The Standard Motor Car Co., Hudson and Essex, reports a bad shortage in all models, with only two cars on the floor. Cars are sold ahead for a month or more and buyers are clamoring for deliveries.

The Columbus Packard Co. is in the same position as the other agencies.

Wilbur Winders of the Winders Motor Car Co., Chevrolet, reports about the same condition of affairs.

Louisville

LOUISVILLE, Ky., April 19—Most of the dealers and distributers in Louisville are booking orders to be filled thirty days ahead, and they do not expect the supply to catch up with the demand until fall, perhaps not them. Letters and telegrams fail to bring a satisfactory number of new models, and much valuable time is spent by the dealers on trains running between Louisville and factories in Michigan, Ohio and Indiana. Personal pleading has little effect on the sales and production managers. They declare they simply cannot turn out cars fast enough to meet the demand.

More cars would be sold by the dealers if they could make immediate deliveries. In several cases after a prospect has made up his mind to buy a certain make of car and is told he will have to wait for three or four weeks before he can drive his car, the prospect says he simply will not wait, must have a car right away, and he goes to one of the few agencies, handling other makes of cars, where he can obtain a new model from the floor.

Ford dealers are able to deliver sedans immediately, while purchasers of touring cars have to wait about a week before the cars are delivered. It takes three weeks to get a runabout or a coupe. The Louisville Ford assembly plant, which was used by the Government for some time, starts making deliveries to dealers next Monday.

The Southern Motors Co. has about fifty unfilled orders and cannot promise delivery on Packard and Hudson cars until the latter part of May. The Standard Auto Co. cannot make deliveries on Cadillacs until June, while Reo buyers have to wait thirty days. James Limbird, head of the Overland-Louisville Co., does not look for any relief in the situation until next August. It requires thirty to sixty days to get a new Overland in Louisville, and repeated trips to the factory on the part of the dealer does not get them here any earlier. The Leyman Motor Co. cannot make delivery on a Buick in less time than a month.

Kansas City

KANSAS CITY, Mo., April 19—Shipments of cars are just about keeping pace with sales. Many dealers are not exerting their full selling energies, since the resumption of full volume of deliveries seems still uncertain, and half time suffices to sell all the cars that can be secured for delivery within thirty to sixty days. Reserve supplies of cars are no hand in few distributing establishments and in the hands of some dealers in the territory. It cannot be said that there is, today, an actual shortage of motor cars in Kansas City or in the territory, though there is shortage in some establishments, and in others the receipts from the factory are barely keeping up with sales.

W. J. Brace, Hudson-Brace Motor Co. got fifty cars from Chicago in October—looked like white elephants then but they have "saved the life" of the distributer the last month. The company is now putting out cars as fast as they arrive, with no prospect of shipments getting ahead of orders for several months—possibly not at all. If more cars were available, sales could be pushed faster. Getting about half as many cars as could sell now.

E. M. Lied, manager Overland branch, reports, following a tour of Kansas, that dealers are highly optimistic but that Overland dealers, as well as some others, have cars on hand. Many prospects are just at the point of buying, but sales re-

(*Concluded on page* 19)

EDITORIAL

Misapplied Army Training

THERE is a condition manifesting itself in many parts of the country that is bound to play havoc for a time at least with service conditions, and that is the mushroom repairshops and service stations set up by individuals passing themselves off as full-fledged mechanics and A-1 service men. This state of affairs is due to the many men released from Army service recently and who perhaps have had some training in the care and repair of motor car equipment but who lack the business training to manage repairshops.

MANY of these men are endowed with the idea that a few months' experience in caring for Army trucks and cars has fitted them for running a service station or repairshop in the same satisfactory manner it has taken dealers generally several years to acquire. While it is true a man can be taught many things in the way of repairing or adjusting engines, such as cleaning out carbon, grinding valves, etc., it is another story to scrape bearings by hand and other such processes, which good mechanics must spend years at before they become efficient.

THE car dealer who already has established a good reputation for service has been put to some inconvenience by these overnight repairshops, and the result has been that many dealers again are establishing night service to protect their patrons. In one large Southern city, for instance, there are now twenty-three more repairshops than a year ago. Investigations show that the owners of these are chiefly men who have come from the Army, such as the Motor Transport Corps. These institutions are not, as a rule, members of any dealer organizations and consequently have not definite service policies such as dealers in any one locality agree upon, for instance, night closing, cash basis, etc.

TO protect their patrons from such service the dealers in this city have been forced to open their places again for night service. A great deal of driving is done at night, and obviously these mushroom shops are a temptation for the car owner in case something should go wrong with his car. But if the service station to which he is accustomed is open, naturally he goes to where he is assured of the right kind of service. A Buick dealer in this particular Southern city found a client's engine almost ruined by mechanics from one of these post-war shops, and to keep up his reputation as well as keep his customers satisfied he decided to keep open house during the night.

IT is very likely these mushroom repairshops will not last but a few months, as their owners have little knowledge as to the business end of the place and hence probably will die out eventually. Their owners then will go back and work for the man who by that time they probably will have found out knows more about overhead, service, costs, satisfied customers and the host of other things required for carrying on successful service than they do. If these Army-trained mechanics would apply their added knowledge to the best advantage under the able guidance of a good dealer, they would accomplish more in the long run and the industry would gain more from their Army experience.

Roads, Horses and Tractors

ALTHOUGH the tractor trade has not been active this spring, there is every reason to believe it will improve by June or July. So far as the Central West and the Northwest this side of the mountains are concerned, the demand for tractors up to the present this season has been very disappointing. Only here and there has the demand been at all active. For the most part tractors have been moving very slowly. Various reasons have been assigned to account for this, most of them highly speculative.

PERSONAL observation in a considerable portion of the field in question forces the conclusion that two entirely disconnected reasons account primarily for tractor trade apathy. These, in the order of their importance, are poor roads and the low price of horses.

FROM Mason and Dixon's line to the Canadian border, and from the Mississippi river to the Rocky Mountains, the roads have been horrible for nearly all the winter. In Iowa, Nebraska, Southern Minnesota, the Dakotas and other sections the roads have been literally impassable most of the time. The farmers could not get to town, nor could anything purchased in town, particularly anything like a tractor, be delivered in the country. This put practically a prohibitive embargo on the tractor business.

THERE has been no market for horses. Rightly or wrongly the farmer expects a tractor to displace a certain number of his horses. But he will not sell his horses to buy even a tractor when the price for horses is so low he feels that to sell is almost to give them away. This having been the case during the last few months, the farmer has reasoned that inasmuch as he could not sell at a profit he might as well keep his horses and use them this spring and defer the purchase of a tractor until such time as the horse market might improve.

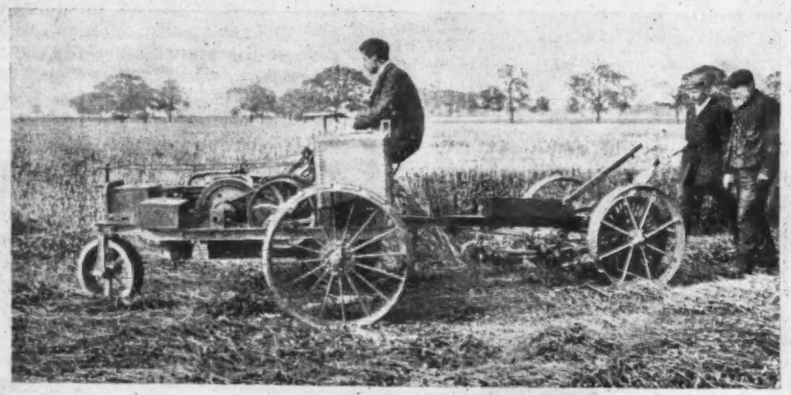
GENERALLY speaking, however, the farmer is sold on the power farming idea and stands ready to be convinced if the right man goes about convincing him in the right way. But bad communications and poor markets for horses have conspired to keep the right man away from the farmer on the one hand and to spoil the value of one of his most weighty arguments on the other.

PRESENT prospects, irrespective of the disappointment that has been experienced, are that there will be a very active demand for tractors later this year. In some sections this will begin to manifest itself as soon as the seeding and planting season is over; in others it will come only after this year's small grain crop is harvested. But early or late, it is sure to come. The conclusion is that from June 1 to the last of August will see a heavy sale of tractors.

Farm Tractors Seventeen Years Ago

FARM tractors are not quite the new idea we sometimes think. Their development in the practical way has been of recent growth, but reference to the early issues of MOTOR AGE will show that even as far back as 1902 more or less practical applications of mechanical power to supplant the horse on the farm were undergoing trial. The Ivel tractor, illustrated and described in MOTOR AGE, Aug. 14, 1902, was among these early ones, and it is interesting to note this design in tractor was sold in sizable quantities for some years thereafter. Just as MOTOR AGE pictured the beginning of the tractor it has recorded the development through the succeeding two decades.

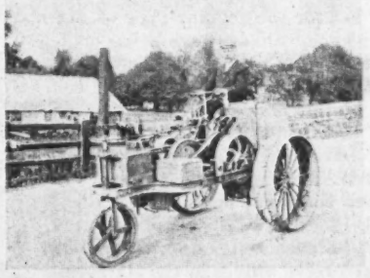
...om here to the ...are already on the ...to ten of them will be used in this ...vehicles will start from the center of the ...o Iron Springs in Manitou and return, to Cheyenne and return, east to the Santa Fe depot and ...through the residence district. Mr. Crane stated that they would not be run through the Garden of the Gods. Trips will take about 2 hours, and carriages will leave the central point every hour. The fare to be charged will be $1. "The success of this institution has



THE IVEL AGRICULTURAL MOTOR IN OPERATION.

MOTORS FOR AGRICULTURAL USES.

An English manufacturer, Dan Albone, has been devoting time and attention to the production of self-propelled agricultural implements and has invented and patented what promises to be an economical and reliable agricultural motor. Albone is well equipped for his task. He is a practical motor-maker, and an agriculturist to boot. The Ivel agricultural motor is of the portable type, and constructed to draw mowers, reapers and other agricultural machinery. Apart from its full use, chaff-cutting, root-pulping and corn-grinding are well within its province. The motor is of 8 horse-power, double cylinder, water cooled. It has electric ignition, one speed forward and reverse, and the inventor claims that any intelligent man can drive it after a short tuition. Simplicity is the keynote of its construction. The engine is free, and when put in motion a friction clutch is employed to transmit the power through an intermediate shaft to the balance gear shaft of road wheels, by means of patent silent chains. The wheels have extra wide rims with grips to prevent them from skidding round. For traveling on the high road detachable rubber pads are attached to the rims of the wheels by means of thumb-screws. These rubber pads minimize vibration and lessen the noise. The cost of fuel in running the Ivel motor is considerably less than that of horse labor. An important trial of this agricultural automobile was held in a grass field, near Biggleswade. All present were much interested in the experiment, expressing themselves delighted with the motor, and congratulated Albone upon the success of his invention. Albone is more than a manufacturer, he is an enthusiast thoroughly convinced that the farmer's motor will become a real factor in the agricultural world, and that the Ivel is the pioneer of a great host of such machines.



Dan Albane and His Motor.

Automobiles for Public Use.

BUTTE, Mont.—F. Jay Haynes, president of

THE MOTOR

Ea... made ... tested ... state ... the Eas... stated ... Mr. Mc... mobile ... vehicles. ... Washin... Gasolin... compan... motor ... make on...

GLOUCES... in the city ... from the de... haps another ... be large open ... been operated ... motors of the ... profitable dur...

HUTCHINSO... in a $10,000 ... service if for ... estimated, t... would carr... routes, cer... street cars ...

SAULT ST... an automobi... the passenger ... the American ... nun and Por... of Brock and ...

PORTLAND, ... ganized to op... Camden, there ... Co. The capi...

BOSTON, M... has granted ... Transit Co., ... this city.

One day ... automobiles ... of Chicago ... mentioned ... them the ... South Pa... "Have ... "My ... good ...

Advantages in Handling Power Equipment with Tractor

CHICAGO, April 18—There is a big advantage in handling a complete line of automotive equipment, including in that term the power equipment which will be used with the tractor. Not only is the dealer enabled to sell his customer all the equipment the latter needs, thus concentrating on volume business, but it helps out on the cost of service as well. This is well put by an automotive dealer who sells motor cars, tractors and all sorts of farm operative equipment. He says:

"It isn't as expensive to look after a tractor outfit sale amounting to, say, $1500, for instance, as it is to look after smaller items which may amount to as much in the aggregate. By this I mean the setting up, the delivery, getting settlement, etc., do not cost as much. Thus the cost of service per dollar of sales is actually less. Just so much service must be given on the tractor anyway. This is free only to the farmer. It costs the dealer. Now, if full price is got for the goods which are sold with the tractor, the plow, the harrow and the like, the service cost is spread over the whole sale and the ratio per tool is cut down.

"When service cost is figured in this way the dealer can better afford to stay with his customer and give all the service he needs. I don't believe much in charging a customer for service. When I offer service I go the limit. I use a car and respond to calls for service just as a doctor does to calls for his attention. I credit more than half my sales to good and quick service.

"The customer will need some service in a majority of instances, and I accept this fact as giving me an opportunity to do something for him which will make him my friend. He plugs for me in the community.

"Generally speaking, I furnish service from start to finish for one season free, and after that I continue the free service or charge for it according to circumstances and according to the man. If he is working in my interests, I feel that I can do no less than accommodate him when he needs help. I do not look with favor upon trying to apply any hard and fast rule to the matter of free service, for I do not believe any dealer can make such a rule stick. He must be governed in every case by circumstances."

TO BUY AUTOMOTIVE SUPPLIES

Washington, April 18—The postoffice is asking bids on motor vehicle and aviation supplies to be made not later than May 12. Supplies are required for 1,433 cars and trucks and include pneumatic non-skid casings, both fabric and cord, gray and red inner tubes of all sizes, inner patches, rims, solid, demountable and pressed-on tires, steel for demountable rims and hard base cushion tires, of all sizes, fire extinguishers, hub odometers, spark plugs and porcelains of all sizes, graphite, grease, oils, soap, radiators, 9000 gal. of Liberty Aero oil and 175,000,000 gal. of aviation gasoline.

G. M. TRUCK GOING GOOD

Pontiac, Mich., April 18—The General Motors Truck Co. finished its war work in January, when 500 trucks were turned over to the Government, and is getting fair production for commercial sales. An average of thirty machines is being turned out daily, but plans call for a material increase in production during May and June. This company, having extended its manufacturing facilities last year, does not come in on the General Motors expansion plan.

MORE PROFIT SHARING

Detroit, April 19—The United Automobile, Aircraft and Vehicle Workers' Union, a new but strong organization, is threatening a general strike unless a settlement is made along union lines at the Wadsworth Mfg. Co., where 1500 body builders have quit. This company refuses recognition and has thrown the strike organization into a badly disorganized condition by announcing a profit-sharing plan with a minimum wage scale of $6 a day patterned exactly after the Ford plan. The company will retain its present 8½-hr. day with no work Saturday afternoons.

Twenty-two Cars for Indianapolis

Sarles to Drive Oldfield Car—Four Hudsons In—French Racers Sail

CHICAGO, April 21—Prospects for the 500-mile race at Indianapolis, May 31, grow brighter each week for a big event with the list of entries swelling. Barney Oldfield is going to enter his Golden Submarine with Roscoe Sarles as driver. This car has undergone some little change since Harry Miller built it for Oldfield two years ago. The steel-ribbed aluminum body has been discarded for the regular type of racing body, and some changes are being made in the engine.

A third Hudson has been entered. Leon R. Stewart of this city has rebuilt a stock car and H. C. Simmons will drive. Eddie Pullen will drive A. H. Patterson's Super-Six and W. W. Brown of Kansas City will drive another that will be tagged a Richards special. This last car cannot be raced as a Hudson because instead of having the conventional twelve valves in the six cylinders it has twenty-four, as well as steel cylinders. J. M. Reynolds also will drive a Hudson.

Sail from France

As reported previously, Jules Goux, winner of the race in 1913, Louis Coatalen and Jean Chassagne of the Sunbeam factory and Andre Boillot have sailed for America to take part in the 500-mile. This will be the first visit for Coatalen, builder of the Sunbeam. Coatalen and Chassagne sailed the 15th from Liverpool. Andre Boillot, brother of the Peugeot star, Georges Boillot, who was killed in aerial combat the second year of the war, sailed early in the month from Bordeaux. Just what Boillot will drive in the race is not known but he is said to be bringing over a small edition of the Peugeot that has a piston displacement of only 152 cu. in. If he does not drive this, he may obtain one of the 300-in. Peugeots.

Jules Goux will drive the Peugeot that belongs to the Indianapolis speedway and which Johnny Aitken used to drive. Goux also plans to obtain the agency for a car, truck, tractor and sewing machine before returning to Paris. He sailed from Bordeaux the 12th. Coatalen will not drive himself, having signed Dario Resta, as announced in a previous issue, to drive the Sunbeam Josef Christaens was nominated for. Coatalen also has business to look after here, as Resta has taken on the agency in this country for the Sunbeam with headquarters in New York.

Entries to date are as follows:

DRIVER	CAR
Durant	Chevrolet
Resta	Sunbeam
Chassagne	Sunbeam
De Palma	Packard
Mulford	Frontenac
Chevrolet	Unnamed
Brown	Richards
Pullen	Hudson
Simmons	Hudson
Reynolds	Hudson
Cooper	Stutz
D'Alene	Duesenberg
O'Donnell	Duesenberg
Milton	Duesenberg
Hitke	Roamer-Duesenberg
Hickey	Stickel
Thurman	Thurman
Goux	Peugeot
Howard	Peugeot
Shannon	Mesaba
Hearne	Durant
LeCocq	Roamer

BARNEY'S CHRISTIE JUNKED

Cleveland, Ohio, April 19—One of Barney Oldfield's first acts when he retired from racing to be a tire manufacturer was to junk his old Christie. For distances up to 2 miles the Christie probably was the fastest car of its generation. It carried to the boneyard the official world's speedway records up to 2 miles and the record for one lap on the Indianapolis speedway, 1:27.40.

The Christie was considered one of the most dangerous speed cars. Its front wheels keyed solidly to the axle, which also was the crankshaft. This construction permitted no differential, making it necessary for both wheels to turn at the same rate, regardless of direction in which they might be pointed. When a front tire collapsed the driver lost all control and the car somersaulted or turned off sharply and rolled over several times. Crankless, it had to be started by towline. Clutchless, it had to be stopped by stopping the engine, a huge two-cylinder. Barney bought it for $800 when it was virtually abandoned. Incidentally the junkmen resold the bronze and bearings alone for $450.

OHIO REGULATES SPEED

Columbus, Ohio, April 18—The Ohio legislature has passed the Lloyd bill providing for speed limits of 30 miles in the country, 15 miles in built-up sections of municipalities and 20 miles in residence sections of cities and towns. This law succeeds the old state law and nullifies all ordinances which seek to fix speed limits.

HIGHER FEES FOR MICHIGAN

Lansing, Mich., April 19—Car, truck and motorcycle licenses in Michigan may be raised by the legislature 10 cents a 100 lb. on cars and from 15 to 25 cents a 100 lb. on trucks in addition to an increased tax on truck horsepower of from 15 to 25 cents. The horsepower tax on cars remains unchanged.

In addition to an increase in the license cost of all cars and trucks, a straight tax of 50 cents a 100 lb. is provided for all trailers. It is estimated the revenue from the increased tax will amount to approximately $800,000 a year.

IOWA REVISES TAXES

Des Moines, Iowa, April 18—The revised motor license tax necessary to make effective the good roads bill passed by the Iowa legislature two weeks ago was one of the last measures to be passed by the legislature this week. The measure aided by Government funds will provide about $7,500,000 for road work during the next year. Under the provisions of the license bill the motor car department is transferred back to the office of the secretary of state. It was given to the state treasurer a month ago on account of inefficient handling.

Under the new license law the minimum fee will be a minimum of $10, the fees being based upon 1 per cent of the purchase price plus 40 cents for each 100 lb. of weight. On trucks the licenses will be as follows: 1-ton, $15; 1½-ton, $22.50; 2-ton, $30; 2½-ton, $45; 3-ton $65; 3½-ton, $90; 4-ton, $105; 4½-ton, $120; 5-ton, $135; 6-ton, $165. If the truck has solid tires, an additional tax will be made.

In the future fees will be paid to the county treasurers instead of to the state offices.

HIGHER ILLINOIS TRUCK FEES?

Chicago, April 19—A bill has been introduced into the general assembly to tax trucks 25 cents a horsepower plus 35 cents for each 100 lb. of gross load, including the weight of the vehicle and maximum load. Under this plan a state license for a 5-ton truck would cost about $65 a year. The present rate for most 5-ton trucks is $16.

Trucks on solid tires would be restricted to 12 m.p.h. on country roads while pneumatic tires would permit 15 m.p.h. A clause also authorizes highway officials to declare an embargo on heavy trucks on any road in the spring, when the frost is coming out of the ground and the roads are soft. The trucks could not be barred more than forty-five days in a year, however.

AUTOMOTIVE SCHOOL OPENS

Chicago, April 21—Chicago's first motor car school, which is to be a part of the regular city system, opened to-day in an old high school building. Any owner or member of his family, mechanics, chauffeurs and other professionals are eligible as students. Edwin G. Cooley, principal of the city continuation schools, in co-operation with a special committee of motor car makers, dealers and garage owners representing about 150 Chicago firms, will have charge. The committee will be advisory.

The purpose of the school, which was described in a previous issue, is "to increase the efficiency of persons using or working with motor cars, whether mechanics, driver owners of cars and members of their family authorized to operate cars under the state laws."

FOR UNIFORM TRAFFIC RULES

Rock Island, Ill., April 18—A campaign was launched this week for members of the newly organized Inter-state Motor Vehicle Protective Association, designed to protect owners and their drivers in Rock Island, Moline and East Moline, Rock Island county, Illinois, and Davenport and Scott county, in Iowa. Officers have been elected as follows: President, R. E. Beedee, Davenport; vice-president, G. A. Shallberg, Moline; secretary-treasurer, F. R. Frazier, Davenport.

The organization was formed to bring about harmony between the cities and states on the opposite shores of the Mississippi river. There is a conflict in the license system and traffic regulations, and vehicles of one county that cross the river may violate the regulations. Scores of commercial vehicles now carry the license plates of both states. It is felt this is unreasonable and that the payment

for the second plate is unnecessary. The membership fee is nominal, and as a result it is expected several thousand firms and individuals will join.

Fourteen civic organizations have pledged their support. Every commercial firm engaged in inter-state business and all owners who may have occasion to drive across the river will be asked to join. It is believed uniform traffic laws and license regulations can be adopted and thus eliminate the present antagonism, ill feeling and contradictions, which has led to frequent arrests and the assessment of fines. An executive governing board will work to bring about the desired uniformity and put an end to the controversy due to innocent infractions of the laws on both sides of the river.

$112,000 TO BOOST SHOW

Kansas City, Mo., April 18—It was brought out at the annual dinner of the Kansas City Tractor Club that the twenty-nine members gave $112,000 to boost the tractor show this year. Prospects for the fifth annual tractor show, to be held here next February, are good. Guy H. Hall continues as secretary and manager. The other officers are: President, R. F. Crawford; vice-president, M. R. Voorhees. Managers of factory branches and tractor distributers compose the club.

ALBANY HAS SHOW

Albany, Ala., April 19—Airplanes lent variety to the third annual show held by the Malone Coal, Grain & Motor Co. here April 16-19. About 60,000 attended the show, which occupied 45,000 sq. ft. of floor space. Moving pictures were shown, and special concerts added to the interest. No admission was charged. Citizens of Albany and Decatur, the twin cities of Alabama, presented a gold watch to B. L. Malone, president of the company, in token of their appreciation of his enterprise.

BLOOMINGTON SHOW OUTDOORS

Bloomington, Ill., April 18—The annual show of the Bloomington Automobile and Tractor Association will be given around the courthouse square May 1-3. It has been found impossible to secure a building large enough to hold all the exhibits. Entries for 120 vehicles have been received, the capacity of the available space. The trucks and tractors will be kept together on the west side of the square, while the cars will be on the other three sides. Merchants engaged in business in the blocks adjacent to the show have subscribed liberally toward the expense of decorations. This will be the first show held in two years, last year's being called off on account of the war.

FORDSON IS TAKING INVENTORY

Detroit, April 18—Henry Ford & Son have closed the tractor plant at Dearborn for the first time in eighteen months. The plant will remain closed for two weeks for a general inventory. The company is bending all efforts to hit the 1000 daily production mark by May 1. Last Saturday 914 complete tractors were turned out. Since the company started in the business 53,075 machines have been made and sold.

Nonstop Flight—Chicago-New York

Capt. E. F. White Makes Distance at 106 M.P.H. in De Haviland 4

CHICAGO, April 20—After several unsuccessful attempts at a nonstop flight from this city to New York, it has been accomplished by an Army aviator in a De Haviland 4 at the rate of 106 m.p.h. The flight was made by Capt. E. F. White from Ashburn aviation field here to Hazelhurst field, Mineola, L. I., in the actual flying time of 6 hr. 50 min.

Officials of the Aero Club of America are credited with saying the successful aviator not only is the first to make the nonstop flight from Chicago to New York but he may also be the holder of the American, and perhaps the world's, record for continuous flight. Captain White has been awarded the club's medal of merit "in appreciation of his marvelous demonstration of the practicability of using airplanes for fast transportation."

The De Haviland used in the flight was equipped with a twelve-cylinder Liberty engine of approximately 400 hp. and recently was flown from Dayton to Detroit and from Detroit to Chicago. The flight was made at 10,000 ft. and, at intervals, 12,000 ft.

Captain White is officer in charge of flying at McCook aviation field in Dayton. He was accompanied by his mechanician, H. M. Schafer.

ST. LOUIS READY FOR DRIVE

St. Louis, Mo., April 21—P. H. Brockman, just elected president of the dealers' association, has been made chairman of the Victory loan committee for the Seventeenth Ward, in which most of the motor car establishments are. Later the Nineteenth Ward, in which the automotive industry is strong, was added to his territory and he named C. E. Lightfoot of the G.M.C. Truck Co. as chairman of that division. They will have about 150 automotive salesmen on their staffs.

WHO WILL BE NEXT?

Buffalo, N. Y., April 18—Buffalo dealers broke all patriotic records when to-day, three days before the Victory Loan campaign opened, they over-subscribed a quota of $278,400 after a 1-hr. campaign. Charles B. Kane, president of the Retail Automobile Dealers' Association, and E. H. Baker, chairman of the dealers' loan committee, underwrote the quota assigned them and an hour after undertaking their bond selling campaign had pledges amounting to $300,000. This committee was the first to begin work in the Victory loan campaign.

CHICAGO ALL SET

Chicago, April 18—Well, they're off. At least Timothy D. Beard, executive of the automotive committee of the Victory Liberty loan trades organization, must think so, for he's wading around in a wagonload of literature, stickers and what not, getting in readiness the ammunition which is to help the different members of the Chicago trade go over the top again. For they're going over here in Chicago early. There's no doubt of it. Past records wouldn't permit it in the first place. The motor car and accessory division exceeded its quota on the Fourth Liberty loan 268 per cent. The grand total showed $4,566,300 as compared with $1,700,000 which the motor concerns were put down for.

The campaign organization of the Chicago trade is practically the same as for the last drive. L. A. Peil, Mitchell distributer and president of the Chicago Automobile Trade Association, is chairman; otherwise, the personnel remains about the same. Last Liberty loan, George H. Bird of Bird-Sykes Co. was president of the trade association and headed the campaign organization. He's still on the job as for that matter, as vice-chairman of the branch house subdivision.

As before the motor car and accessory trades committee is organized with subdivisions, namely, branch houses, passenger cars, trucks, accessories, tires, wagon and body builders, garages and repairshops, motorcycles, taxicabs and service stations.

The Victory Liberty loan drive in the trade will open formally April 23 with the banquet to Capt. Eddie Rickenbacher at the Auditorium hotel. Not only the Chicago Automobile Trade Association but other motor organizations of the city will be the hosts, and it will be called the Rickenbacher Victory loan dinner.

PHILADELPHIA TRADE ORGANIZED

Philadelphia, Pa., April 18—The trade has been organized for the Victory Liberty Loan drive with headquarters those of the Philadelphia Automobile Trade Association. The following committees and chairmen have been appointed: Makers and dealers, H. B. Harper; tires, W. R. Walton; accessories, motorcycles, repairs and Bicycles, T. Scott Eavenson; wagon and body builders and wheelwrights, August Geissel; garages, George G. Blind.

PARCEL POST BY TRUCK

Philadelphia, Pa., April 19—Well satisfied with the operation of the motor truck parcel post system from farm to consumer in the vicinity of Philadelphia, Fourth Assistant Postmaster General James Blakslee is investigating with a view to using government trucks to send out bread and laundry from Philadelphia to the upstate distributing centers of produce and to farmers. Fresh bread, for instance, would be delivered in Lancaster and vicinity in time for the evening meal. Many farmers would be glad to patronize the Philadelphia laundries. The finished work could be delivered in good time, and the cost is only a cent a pound on all classes of goods handled by the Government trucks.

N. A. D. A. Outlines Four Definite Campaigns

Elimination of Tax on Cars—Support of Townsend Bill—Uniform Laws—Stabilized Truck Market

ST. LOUIS, Mo., April 21—The first quarterly meeting of the executive committee of the N. A. D. A. was held last week in the association rooms at 3124A Locust street. There were present F. W. A. Vesper, president; W. J. Brace, Kansas City; P. E. Chamberlain, Denver, and A. E. Maltby, Philadelphia, directors, and Harry G. Moock, business manager.

Four definite objects for the immediate future were outlined as follows:

1—Classification of the motor car as an essential and not a luxury and the consequent elimination of the 5 per cent luxury tax on cars.

2—Support of the Townsend bill for a national highway commission and system.

3—Uniformity of state legislation.

4—Stabilization of the truck market.

The carrying out of No. 1, of course, especially looks to the new Federal tax laws by the next Congress. The N. A. D. A. hopes to get into this fight in time.

The uniorm state law will concern licensing, taxation, mortgage recording, mechanics' liens, liability, headlight regulation, speed laws, protection for sales of the conditional vendor and the like. The N. A. D. A. has in preparation such a model law and will have it ready to begin a campaign wherever state legislatures are to meet. Much of the recent effort to pass such laws and the confusion resulting of the different ideas in almost every state are laid largely to a lack of a guide. The N. A. D. A. hopes to supply that and to help pass it.

The stabilization of the truck market refers to the War Department trucks. The present efforts to stop auction sales will continue. The Townsend bill is self-explanatory.

WATERLOO FOR ORGANIZATION

Waterloo, Iowa, April 18—The Automobile Dealers' Association of Waterloo recently held one of the most successful trade meetings ever held in this section. As guests most of the dealers in Black Hawk county were present, as well as officers of the newly formed Iowa Motor Trades Bureau. There is more enthusiasm for organization in this section than there has been since the beginning of the industry and it is felt that it is much more needed now than ever before, due to legislation on road bills, lien laws and motor car license laws.

DEALERS KILL BAD BILLS

San Francisco, Cal., April 18—Trade in this state has been very busy during recent months combating undesirable legislation. Among the bills that were killed was one which would have prohibited the use of a paint-spraying machine.

Another bill would have compelled the recording of all lease contracts and car sales agreements. It would have restricted the selling of cars considerably.

Another bill would have compelled the publication of all such matters—it also was killed.

Another bill proposed the registration of all mechanics. This also was stopped.

Still another bill would have required that the seller of goods on a lease contract or installment payment plan, return to the buyer the initial payment on making the sale before he could foreclose or demand the return of property because of delinquency in payment. This would have meant that before a dealer could foreclose on a partial payment car he would have to give the buyer all his money back. This bill was killed without a great deal of trouble.

Other bills of a different character were supported by the dealers.

IOWA TO MEET MAY 1

Des Moines, April 19—The Iowa Motor Trades Bureau will open its offices here May 1, at which time the regular April meeting will be held. Andrew J. Knapp, now secretary of the Commercial Club of Waterloo, has been elected secretary of the state bureau and will move to Des Moines. The state organization will issue bulletins every two weeks to more than 3000 dealers in the state. Fifty-seven members were obtained at the meeting in Waterloo recently.

David Beecroft, directing editor of the Class Journal publications, will be the speaker at the meeting of the Iowa Motor Trades Bureau May 1.

TO MAKE JAPANESE TRUCK

Detroit, April 18—A Japanese company is being organized to manufacture trucks in that country. Through Gaston, Williams & Wigmore, New York, this company is placing orders with Detroit firms for parts for several experimental trucks it proposes to assemble at once. The company, with $2,500,000 capital, is buying engines, gearsets, steering gears, wheels, clutches and other parts. Cutting, Armstrong & Smith and the Grey Motor Co. of this city have received preliminary orders for this material and are preparing shipments for New York.

APPERSON TO SHARE PROFITS

Kokomo, Ind., April 19—The Apperson Brothers Automobile Co. has announced a profit-sharing plan under which 25 per cent of the company's profits each year will be divided among employees who remain with the company throughout the year.

"In our decision to adopt the profit-sharing plan we make no pretense to having been actuated wholly by altruistic motives," said Edgar Apperson, in announcing the plan. "We have been moved by a desire to induce in every individual among the employees of the company a personal interest in the company's prosperity. The proposition means that after deducting the 8 per cent allowed by the Federal income tax law on invested capital we will share 25 per cent of the remaining profits with those of our employees who stay with us through this year. We believe this will stabilize our labor supply, keep our employees contented and beget in them a special interest in their work."

The share of the profits for each employee will be the pro rata part of the total profits to be distributed in proportion to the amount of money paid to each during 1919. The distribution will be made at the same time dividends are determined for stockholders.

WHITE NOW WITH E-B

Rockford, Ill., April 18—Frank M. White has joined the Emerson-Brantingham Co. as director of its farm power bureau, which has been organized to develop closer relationship between Emerson-Brantingham dealers, owners and the company. For several years Mr. White was head of the agricultural engineering department of the University of Wisconsin.

TO MAKE NEW RADIATOR

Chicago, April 19—The B. & W. Mfg. Co. has been organized to make radiators for motor vehicles. It is capitalized for $600,000 under the laws of South Dakota and all the officers and directors but one are of Mitchell, S. D. S. D. Briggs will be manager; C. E. Brelsford, eastern representative with headquarters in Detroit; R. H. Cory, formerly with Perfex, will handle western territory from this office.

Production is 500 radiators a day and is to be increased to 600. The company states it has contracts for 40,000. Fenton L. Howard, chief engineer, and Philmore F. Spery designed special machinery for the radiators and an additional building will be erected when production demands it. The officers are: President, Lawson W. Wright; vice-president, Gage P. Wright; and secretary, Charles H. Blenkiron.

HAYES TRACTOR WHEELS

Jackson, Mich., April 18—The Hayes Wheel Co. has sub-leased from the Jackson Munition Corp. the plant familiarly known as the Mutual Motors in the west end of the city. It was used during the war by the munition company for the manufacture of high explosive shells. Hayes has entered the tractor wheel field and is placing a new fabricated steel wheel on the market. Large orders have been received and as the Government removes its equipment from the west-end plant that place is being filled with new machinery. Additional machinery has been ordered and its installation is so imperative that much of it is being received by express.

SOME CAR SALESMAN!

Buffalo, N. Y., April 18—Salesmen for J. A. Cramer, Dodge Brothers dealer, have just completed a contest which developed great rivalry between the ten Buffalo sales-

men and stimulated early season sales in marked degree. In the salesroom was posted on a large cardboard a miniature race track with horses and jockeys mounted, each movable. Each jockey was named for a salesman and each day was moved forward in proportion to sales made.

Seymour Field won the race and the $100 prize offered for the winner with sales of one car for each day of the month. Mr. Field's earnings for the month were $1,000. James O'Hara, who took second place, earned $900 during the period. Until three months ago, when he came to work for Mr. Cramer, Mr. Field had never sold or driven a car.

BIDDLE LEAVES FRANKLIN

Syracuse, N. Y., April 19—W. C. Biddle, assistant sales manager of the Franklin Automobile Co., has resigned to take over the dealership for Franklins at Toledo, Ohio, as the Franklin-Biddle Co. Mr. Biddle has been with the company since February, 1913. Since 1914 he has been almost continuously in the factory sales department. E. P. Johnson, on the sales staff since 1915, will succeed Mr. Biddle at the factory.

GIRL BACK ON JOB

Cleveland, Ohio, April 19—President Christian Girl of the Standard Parts Co. is back at his desk after an absence of some time. Last fall Mr. Girl underwent a minor operation and this with an attack of influenza later resulted in a slow recovery.

PENNYBACKER RESIGNS

Washington, April 18—J. E. Pennybacker, director of roads, has resigned as chief of management of the United States Bureau of Public Roads to devote his energies to American Automobile Association highway work.

U. S. MODEL N TRUCK

Cincinnati, Ohio, April 18—The price of the model N United States truck is $1,995 and not $1,595 as stated in the issue of April 3.

ENTER SKF INDUSTRIES

New York, April 18—The SKF Administrative Co. formed in May, 1917, to consolidate the interests of the SKF Ball Bearing Co. and the Hess-Bright Mfg. Co. has been merged with the Atlas Steel Ball Co. into a new company to be known as SKF Industries, Inc. The Atlas company for some time has been controlled by SKF.

The immediate purpose of the merger, which brings together the sales and executive departments of the three companies, is to facilitate the carrying on of important research work. For this purpose ground is being broken this week adjacent to the Hess-Bright plant in Philadelphia. The merger will not affect the financial status of any of the companies and is largely to simplify merchandising problems.

B. G. Prytz, who has been president of all three companies, is president of the new company. Associated with him are: Vice-president, W. L. Batt, vice-president of Hess-Bright; comptroller, J. P. Walsh; sales manager, S. B. Taylor, vice-president of the SKF. The company will consolidate its sales and executive offices in New York. The SKF, Hess-Bright and Atlas plants, the former in Hartford and the latter two in Philadelphia, will be maintained without change.

MEETING PLACE OBTAINED

New York, April 19—The summer meeting of the Society of Automotive Engineers will be held at Ottawa Beach, an exclusive summer resort on the east shore of Lake Michigan, 6 miles from Holland. The society has secured the exclusive use of the Ottawa Beach hotel and cottages for June 23-27. Accommodation will approximate 1000 members and guests. The standards meeting will be held Monday, June 23. In the evening the annual business meeting will take place and Tuesday, Wednesday, Thursday and Friday professional sessions will occupy the program. Two half days will be given to recreation and sports.

The rule which barred women from attending the session the last two years during the war has been waived, and members will have an opportunity of taking their families and combining vacation with the summer meeting.

SCHWARTZ BUYS GROSSMAN

New York, April 18—L. M. Schwartz, formerly vice-president and sales manager of the Emil Grossman Mfg. Corp., has purchased the right, title and good will in that company and with it has acquired the trademark "Ever Good" identified with the Grossman lines of bumpers, mirrors, fan belts, wiring sets, etc., and also the trade mark "Red Rib" designating lines of ignition cable and lamp cord. Mr. Schwartz's activities commence immediately under the former trade name, the Emil Grossman Mfg. Corp, and at the same address.

Is There a Car Shortage?

(*Concluded from page 13*)

sistance continues stiff, due chiefly to popular expectation of some price changes July 1.

Packard sales are not being pushed—no cars locally, or for Kansas.

Studebaker is able to supply about three-fourths of cars actually sold by dealers; no effort to get more dealers.

G. T. O'Maley of the Ford was emphatic in his denial that the factories were keeping up with orders from this district. In some models they are thirty days and in others, fifteen days, in arrears.

K. L. Day, manager of Chandler, also asserts the factories are not meeting his demand and he cannot fill his orders. He is at least seventy-five cars behind. But the first of May his factory promises to be in condition to fill his orders. He could increase his sales all the way from 50 to 100 per cent if he could get the cars.

L. F. Jalageas, manager for Reo, is thirty days behind in shipments and does not believe the factories will catch up before a year from now.

Owen McCusker, manager for Paige, is not able to secure enough cars from his factory as the demand is far ahead of the supply. At present his branch has not a car in the house and 300 behind in sales.

J. F. Martin, manager of the Buick, says the demand is so overwhelming it cannot be supplied. When a consignment of cars comes in he looks over his waiting list and selects those whom he knows must have cars and sends them a few of what they ordered.

Last month Buick distributed 1000 cars. It could distribute 5000 in the next two weeks if it could get them. Recently it received 160 cars in one shipment, and they were all taken at once by a single firm which had to have them. On the waiting list are fifty or sixty dealers who are needing at least fifty cars each.

Boston

BOSTON, Mass., April 21—Factory shipments are much behind. Distributers particularly feel it trying to get cars for sub-agents. Some dealers have only one demonstrator left and big agencies for popular cars in last few weeks had only six or eight or a dozen used cars on hand and these went in a few days after advertising them. This keeps prices of used cars up. It does not look like conditions will ease up before fall. Some dealers are not putting on salesmen to bring force up to strength or before war because they do not need them on account of cars selling themselves, and they do not want to get orders they cannot fill.

Philadelphia

PHILADELPHIA, Pa., April 21—Shortage of cars is real. Ford company says factory shipments are two months behind on closed cars, two weeks on runabouts, catching up slowly.

H. B. Harper, Overland, says shipments cannot catch up with orders this season, short 120 cars this month. Shortage of materials at factory seems to be the handicap. This will be biggest year since Overland-Harper was established in Philadelphia.

Reo says shipment would not catch up with orders till next fall, can get but 10 per cent of allotment for next ninety days.

Hudson says shipments for last three months 25 per cent behind orders and for this month 10 per cent, only seventeen Hudsons in stock where usually 200. Could sell 400 cars more in short order.

Buick says shipments are two months behind orders, could sell 500 cars before sundown if factory could get them here. Factory is speeding up but cannot say when it will catch up.

Packard cannot get any cars before latter part of next month, ahead on truck schedule.

Paige says shipments not nearly up with orders but improving slowly.

Chandler says factory somewhat behind shipments but expect to catch up in few weeks, could have sold greater number if shipments up to orders.

Dixie Dealers Must Organize

Co-ordination of Efforts Will Bring Better Roads and Reduce Sales Resistance for Automotive Equipment

By B. M. Ikert
Motor Age Editorial Staff

A team of mules can haul two bales of cotton. Note the Ford trucks each carry five bales, and faster, too

ATLANTA, Ga., April 18—One of the first things the recently formed Atlanta Ship-by-Truck Association did was to put on a parade. There were seventy-one trucks besides thirteen Army trucks which had been entered to stimulate enlistment in the Motor Transport Corps. Before parading the streets all the trucks went out several miles north of the city to meet the two 2-ton Firestone trucks which had been sent South by the Firestone Tire Co., Akron, Ohio, for the Macon truck demonstration.

It was particularly gratifying to those interested in promoting the use of motor express routes in the South that these two trucks came through as well as they did over the unusually bad road conditions at this end of the journey, for there is a current opinion among many merchants and others that these routes cannot be effectively operated in the Atlanta vicinity. The Atlanta truck dealers by a series of trial runs and demonstrations will endeavor to show the local merchant, farmer and manufacturer that it is both economical and faster to use motor trucks for transporting their wares to points within a radius of 50 miles of Atlanta.

Two-Ton Truck Maximum

For all practical purposes and with present road conditions, the dealers here are almost unanimous in their opinions that a 2-ton truck is the maximum for the highways. It was this fact that caused Wylie West, branch manager of the Firestone Tire Co., to notify the factory at Akron not to send the 5-ton trucks first intended. For one thing the bridges in this section and farther South in the vicinity of Macon would not stand the big trucks when loaded, and furthermore the demonstrations here would be worth more to the ship-by-truck movement if the trucks were of a capacity that could be safely used here. Incidentally it would give to the merchant and farmer a good idea as to how trucks of a capacity he would be likely to buy could perform.

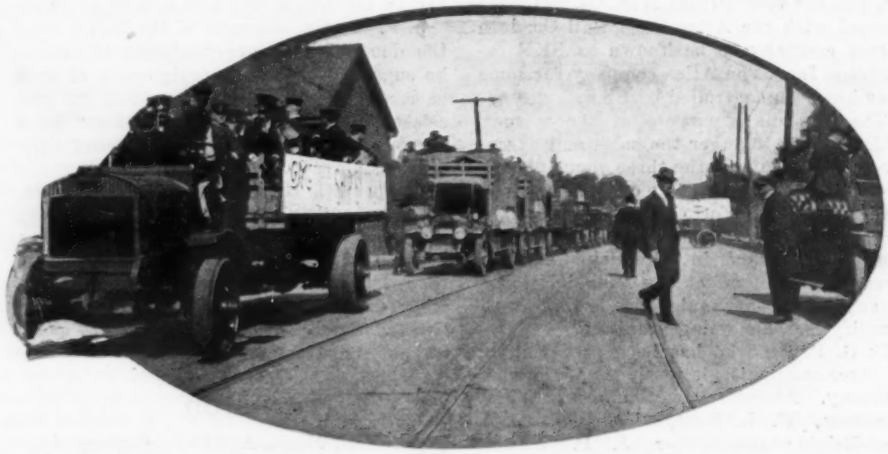
Parades like those of Atlanta and Macon, where hundreds of trucks of all sizes and types participated should be promoted in all sections of the South. There is a crying need in most of the localities around the bigger cities of the South for better transportation of certain commodities of life.

Wylie West, right, who got Atlanta's truck men to organize, and Robert Mathers, Oldsmobile dealer and ship-by-truck advocate

Take truck farming, for instance. A few years ago this was unheard of in most parts of the South. To-day, since the agitation for reduction of the cotton crop, we find many farmers are turning over part of their fields for other crops, and thus the South is beginning to raise its own foodstuffs more and more, which heretofore had to be brought in from the Western and Northern states.

All this means trucks are going to come into use more and more in the South for carrying the farm produce to the cities. Railroad transportation is necessary, of course, but freight trains follow their tracks, not the needs of the communities. The freight train of the highway—the truck—is what the Southern farmer and merchant is going to depend on for moving his wares. There must be transportation that will give the Southern farmer a market for his perishable goods. In Georgia thousands of peaches rot right on the ground where they are raised because there is no ready means of transporting them to the cities. In critical times Georgia peach growers pay any price for a conveyance that will carry the crates of peaches to the shipping points. A 2-ton truck with pneumatic tires can get into the orchards and easily carry fifty crates of peaches at a time, and it is up to the Southern truck and car dealers to show the farmers this.

The majority of dealers in the South blame the farmer of the South for being slow and inactive toward getting automotive equipment on his farm. In a large measure the fault lies with the dealers themselves. Take the tractor, for instance. You may be a tractor manufacturer from the North and come into the rural sections of the South and say the farmers here must have diversification of crops, etc. It is one thing to urge this, but it is a more impor-



At the head of the Atlanta ship-by-truck dealers' parade. Movie men are on the job at the right

tant task to tell the Southern farmer how he is going to change from cotton, wheat or rice, which he has raised all his life, to something else. He must have help; he must be educated in the use of improved machinery and in many instances must have proper financial aid.

Work for Dealers

Dealer associations can do much in the South toward getting the farmers and merchants to see the value of trucks, tractors and farm lights. The South always has been a farming section chiefly, and that is where the big market lies for automotive products. Organized effort is always better than a single effort made by a dealer in trying to get a community interested in his truck or whatever he chances to sell. Unfortunately there is a decided lack of dealer organizations in the South to push matters. What the Atlanta truck dealers did a few weeks ago should be followed elsewhere. Associations of this kind can put on educational campaigns, runs, demonstrations and so on that will do the whole industry good and help to boost every member. No single dealer can afford to do this, and right at the present time these things must be done south of the Mason and Dixon line.

Poor roads are perhaps the greatest obstacle that must be overcome in the South before we see a great increase in the use of tractor and truck. But in all sections of the South we are hearing of bonds being sold for good roads. Hard roads are being built now. Much work of this kind necessarily was stopped during the war. New bridges are being built and not a day passes that we do not see a concrete example of the new order in business throughout the South. Dealer organizations can help the good roads movement, and once the roads are here much of the resistance to car, truck and tractor sales will have been overcome. But the chief message we have for the Southern dealers to-day is to organize and put on demonstrations as Atlanta and Macon did.

Cotton, a million dollars' worth, being held for price increase. A plea for diversification of crops by use of motors

The Aftermath of Macon

Here and There Tractors Are Bobbing Up in Dixie as Result of Demonstration

ALTHOUGH tractors in the South will not begin to show themselves in any great numbers until this fall, it is gratifying to those who saw the demonstration at Macon in March that a good many tractors have been sold as a result of that demonstration. A good deal more fall plowing is going to be done this year than ever before in the South, and those tractor dealers already established in Dixie are unanimous in their belief that this year marks the beginning of power farming on a large scale in the cotton states.

The recent truck demonstration at Macon, where four different routes were traversed by the loaded fleets of trucks, covered much of the territory from which many of the farmers that attended the tractor demonstration came. Thus it afforded a good opportunity to observe from these trucks whether or not any tractors had been sold as a result of the demonstration. On the trip from Macon to Montezuma, about 50 miles, three Fordsons were observed, one plowing and the other two disk-harrowing peach orchards. These machines were not on the same farm but scattered over quite an area. Near Fort Valley a LaCrosse tractor was seen in a distant field. All these machines were sold as a result of the demonstration at Macon.

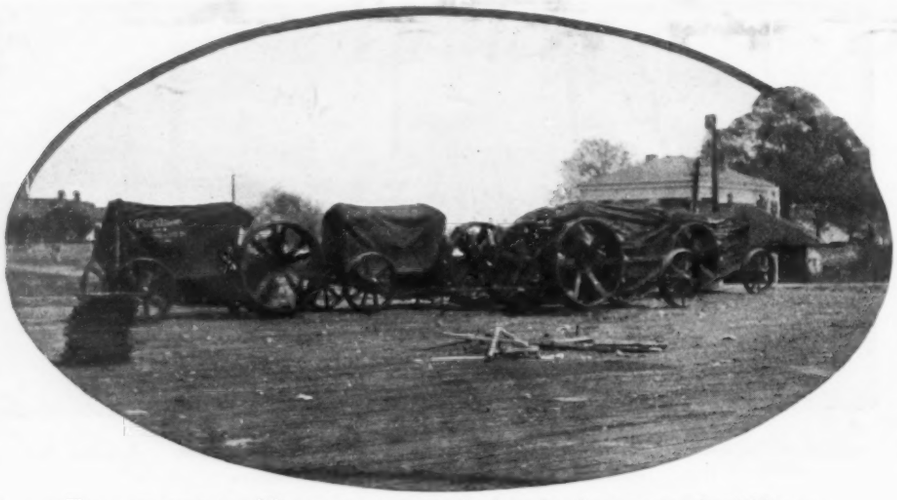
One of the pictures herewith shows five Fordsons on the freight depot platform of a small town about 30 miles from Macon, awaiting delivery to owners in this vicinity. These machines have been sold as a result of the demonstration by McCord & Satterfield, Macon agents for the Fordson. This concern, as well as the other half dozen concerns representing tractors in Macon, have on their books orders for machines to be delivered in the fall. Investigation shows also that a good many farmers who wanted to attend the demonstration could not do so, as they were working their fields. Frequent rains prevented turning the land at the usual time; consequently the lateness of the season demanded they stay on their farms.

Here's what you begin to see in the South, a tractor for display in the dealer's showroom

Rains Harden Land

In the region of Monticello, Ga., five or six tractors were seen in the fields, also a result of the Macon show. The soils of Jasper county are suited to a great variety of crops. It is an excellent location for manufacturing industries, being only 10 miles from the big Jackson dam and power plant. The people of this section are alive to the value of the tractor and truck. Just how many tractors have been sold as a result of the recent demonstration is hard to say, as many of these were sold by representatives of the factories who attended the show.

Farmers in other parts of the South, notably Mississippi, are complaining that the land is so hard to plow the teams are



Tractors awaiting delivery to owners who bought them as result of Macon, Ga., demonstration

giving out. This trouble has been brought about by the excessively heavy rains some weeks ago. In this state weather conditions and farm labor shortage have retarded operations and threaten to prevent a full acreage and normal cultivation. Tractors and gang plows here would not only solve the question of turning the land but also overcome greatly the labor shortage.

Last year it was quite a problem in Mississippi how the crops were going to be harvested. In fact, many farmers were in doubts as to whether or not their farms could be kept going. But in spite of these apparent difficulties, 1918 saw Mississippi produce a record crop in everything it produced. And all this was due chiefly to the tractor. The prairie country in northeastern Mississippi and the Delta region of the west are wonderfully well adapted to the tractor. It did not take many of the farmers in these regions very long to see the value of power farming when they saw them at work in some of the demonstrations carried on in the state by the Mississippi Agricultural & Mechanical College, the county farm demonstrators, state experimental farms and other institutions. Memphis, Tenn., is the great distributing point for the tractors shipped into this state, and Memphis has a list of tractor concerns representing over a dozen makes of tractors.

Stumps in Way

Stumps are the biggest problem to solve before the majority of Southern farmers are going to take to the tractor. There must be a big campaign put on by someone, whether the Government, state, tractor dealers or the farmers themselves, to dynamite. The makers of dynamite would do well to impress upon whoever handles their product in the South the necessity for educating the farmer to clear his land. There is no use to wait for the stumps to rot. A long-leaf pine stump full of pitch will last a hundred years. Some of them are sunk below the soil surface after years of subjection to the elements and that is why disk plows have to be used—so they will roll over the stumps.

Authorities in the South claim the crops can be doubled in most cases on the same land, if it were cleared of stumps and plowed by a gang plow, of the disk variety, with, perhaps, a sub-soiler. But as it is now and has been for years the mule team and 10-in. plow must be used to wend their way about the stumps.

GOOD ROADS MEETING

Waycross, Ga., April 18—The Waycross chamber of commerce sent a delegation of nearly 100 cars to a good roads meeting in Jacksonville, Fla., last week. One of the chief purposes of the meeting was to determine some definite policy by which a road can be built so that tourists can get into and out of Florida. It is practically conceded by all that the central Dixie highway is the logical route for tourists, but it, like the two long routes, has been impassable at times during the tourist season. The meeting was called by the Florida Automobile Association.

NO ITALIAN 1919 SHOW

Turin, March 15—By mail—The Italian Automobile Manufacturers' Association has decided to hold no motor shows in Italy during 1919. This decision has been made to give every opportunity to the industry to get back from a war to a peace basis. It is probable, however, that the leading Italian makers will exhibit at the Paris and London shows to be held toward the end of the year.

$14,000,000 FOR INDIANA

South Bend, Ind., April 18—More than $14,000,000 will be available in Indiana for the building of state roads under the new Federal law, provided the state will contribute dollar for dollar. The enactment of the county-unit road law is a real road-building measure, and it is estimated that 5 miles of road will be built under the act to 1 mile under the state highway law.

During the next three year 2766 miles will be built in the ninety-two counties. It is estimated that 85 per cent of the travel into a county seat or town of more than 5000 is county, state and national in character and does not originate in the township. Under the new law the county pays for the entire cost of building the road. When a road becomes a state road under the supervision of the state highway commission then the state and Federal governments pay the entire cost. The county is not called upon to pay anything for the construction or maintenance of a state road.

ROBINS SEES EUROPEAN IMPORT

Detroit, April 18—That restrictions now in force against foreign cars are very apt to be relaxed in France and England is the belief of H. M. Robins, foreign sales manager for Dodge Brothers, who has just reached Detroit from a trip through these countries. He declares there are many influences at work in England to bring this about. The most progressive English dealers long handled American cars before the war. They sold well, and naturally these dealers are working hard to have restrictions removed. The American Chamber of Commerce in London is also hard at work. Then there is the old free-trade sentiment in England which has always looked with disfavor upon trade restrictions of any kind.

If you are staging anything like a truck or tractor demonstration, you might get an outfit like this to draw a crowd. An enterprising Macon, Ga., music dealer accompanied one of the truck trains in the demonstration there recently and carried a piano player mounted on a special apparatus on a Dodge Brothers

Wanted:

$4,500,000,000 for Victory!

Come On—

Let's Finish the Job

—BUY A BOND—

THE campaign for subscriptions to the Victory loan, the fifth and last of the Liberty loans, has been launched. This loan appropriately has been termed a Thanksgiving loan, and the reason is obvious. It was Uncle Sam's entrance into and participation in the world struggle which brought it to an end months before the most optimistic had hoped for. The fighting is over, but there are some details to finish.

Back of American fighters, as well as of the soldiers of the allies, were American dollars which had been given generously to the cause of freedom by patriotic citizens who did the work of carrying on at home while our boys were giving all they had to give on the battlefield. The fighting is over now, but there still are bills to be paid, and it is to make good our obligations that the Victory loan is being floated.

The money raised by the first four Liberty loans was expended before the armistice was signed, and in addition Uncle Sam incurred billions of dollars worth of indebtedness to expedite peace. This debt of honor must now be paid, and it is a debt of honor which belongs to the individual at home. In order that the task of re-adjustment in the United States may go on as rapidly as possible, it is necessary that the banks keep on hand a supply of funds sufficient to meet the needs of commercial concerns in the extending of business, and in the maintenance of a fair wage scale.

The great majority of our boys will return to the United States. Now more than two million of them are engaged in the tremendous task of reconstruction in the devastated countries of the allies. These boys must have the support which the Victory loan will make possible, and after they have completed their service over there money will be needed to bring them back over here. We have shown our loyalty and our gratitude to them up to the present and we must finish the job by meeting Uncle Sam's and our obligation to them.

The Victory loan bonds will be issued May 20, 1919, and will mature May 20, 1923. They bear interest at the rate of 4¾ per cent and are exempt from normal income tax, state or local taxes. At any time they may be converted into 3¾ per cent bonds, which are exempt from all but estate or inheritance taxes. Although the date of maturity of the bonds of this last Liberty loan is May 20, 1923, the Government may at its option redeem them at par with accrued interest June 15 or Dec. 15, 1922. They are insurance for the future, and in lending your money to Uncle Sam by subscribing to the Victory loan bonds, you not only are helping him but, even more, you are helping yourself.

—YOURS FOR THE VICTORY LIBERTY LOAN—

Why Bill Strong's Service Satisfies

She hunched her shoulders to urge the car on, but it was no use

Liveburg Dealer Sells Customers So Thoroughly They Get Homesick When Away

SHE hunched her shoulders forward over the wheel of her gorgeous-colored four-passenger in a last desperate effort to urge it up the narrow, mountain hill. But it was no use. The engine had been acting with increasing queerness ever since dinner, until on this last, long incline it slowly succumbed.

To a more expert observer the mingled odors of warm rubber steam and hot varnish instantly would have proclaimed that her gasoline-fed pet was suffering from an acute case of overheating. To her, however, the difficulty looked like black mystery.

She brought her gear lever to neutral, set the brake and rested a moment to ponder the puzzle. Something had to be done. There she was 30 miles from home, stalled in the midst of a thinly-populated hilly country, and to make matters worse the dark was coming on.

Engine Had Cooled

Arrising at no solution and not knowing what else to do, she presently depressed the starter pedal, and the engine, having cooled slightly in the short respite, was sufficiently refreshed to drag the car slowly forward and upward another hundred yards before dying again. This brief experience brought a ray of hope, for she reflected that she might keep up the process at least until a friendly farmhouse was sighted, or perhaps she might even be able to gain level country where she hoped that the weakness of the car would disappear. Thus by slow leaps, she eventually reached the valley which led homeward. Once the steep grades were passed the performance of the car improved, and she reached town without further incident.

As she was "dying" to tell her experience to someone, fortunately she met a neighbor and immediately launched into a most detailed account of what happened. As the facts were unraveled, his amusement increased and when she finally finished he asked:

"Why didn't you put water in the radiator?"

"I never have—not in the four months I have had the car," she answered innocently.

"And this is the first time you have had overheating trouble?"

"Yes,"

The neighbor knitted his brows for a moment but presently seemed to reach a solution, when he asked, "It's just two weeks since you left Liveburg, isn't it?"

"Just about."

"You see," he explained, "it isn't that your car does not require water, but back in there Bill Strong's outfit saw to it that your radiator was filled whenever it needed it. Probably they put in a little once a week. But down here at this summer resort you get the ordinary brand of service in place of the Bill Strong brand—the garage here is simply a place to store your car and its owner is guided by no principles or theories so it is well to remember that you will have to look out for your car. You need not expect to get anything you do not ask for or do not order, and even then you must see that you get it. There are very few organizations as dependable as Bill's. Down here you should look at your radiator every day or so, for the warm summer weather and the steep hills which surround this valley call for a greater water consumption than usual. That explains the trouble you had this evening.

"You ought to understand the difference between the service you get out here and the kind Bill gives so that you can avoid similar experiences to the one you had this evening.

"There are two things Bill insists upon: That *no car must be allowed to leave the garage with radiator less than full or with tires with less than normal pressure.* This service is bought and paid for with the garage space. Every night a man goes around among the cars with a large water can and fills the radiators which require it. *Nothing is left to chance; there is no guesswork.*

"Just because a man's radiator was filled last night is no reason why it might not need water tonight. It is a very small, some would say, insignificant, service, this filling of the radiators, but it is important in Bill's eyes, and most customers think so too, for it is one of the reasons why a man may come for his car and drive right off on a trip of any distance. The owner knows the car is ready for service at all times. He knows Bill's policy, and he knows Bill has made it his religion. That is why you thought your radiator did not need water. It's all right to think so in Bill's garage, but it is not safe to follow that policy elsewhere.

Why Tires Were Right

"I'll bet also that you wondered why you never had to have your tires inflated. The reason is that every night, as the cars come in, the foreman runs his eye over all tires and inflates those that require it. To facilitate this work Bill has numerous compressed air outlets so there is always one at hand. Incidentally, this is a little convenience that you may not appreciate. But I have often thanked Bill silently when

a was changing a tire or a tube, for his thoughtfulness in having the compressed air so handy.

"You noticed how much cleaner the upholstery was when you kept your car there. Of course, that was partly due to Bill's superior thoroughness but also to the fact that there was compressed air handy for dislodging dust and dirt from various crannies.

"Another thing you may not appreciate is that Bill has a trouble lamp with a long cord, dangling from almost every post. If you drop something or if there are troubles to fix, no time is lost looking for a lamp.

Service Over Night

"What you will appreciate is the supply service Bill renders. I don't believe that there is a garage which equals him in this respect. You pay so much a month and forget that there is a lubricating system or that water must be put in the battery. You'll be surprised how popular this service is. Nearly all Bill's customers avail themselves of it, and among them are a lot of men who know how to oil their cars. They would rather pay Bill's reasonable charge and keep their fingers clean. You probably didn't realize your car is looked at every night. Oil holes are filled and grease cups are filled or turned down, according to the mileage your speedometer shows for the day.

"*Another little time saver is the order pad with which the garage foreman confronts the owner each night*, making it possible for the owner to order oil, gasoline, other supplies or any work done on his car overnight. A man comes in at night and orders 10 gal. of gasoline and a quart of cylinder oil, signing the slip as authorization. Next morning he drives out without delay, knowing that Bill's organization has attended to these details honestly and to the letter. It saves the man's time and it brings Bill the compliments of satisfied customers as well as more business—because were it not for this practice many supplies would be bought on the road on the spur of the moment according to the sudden demands of necessity.

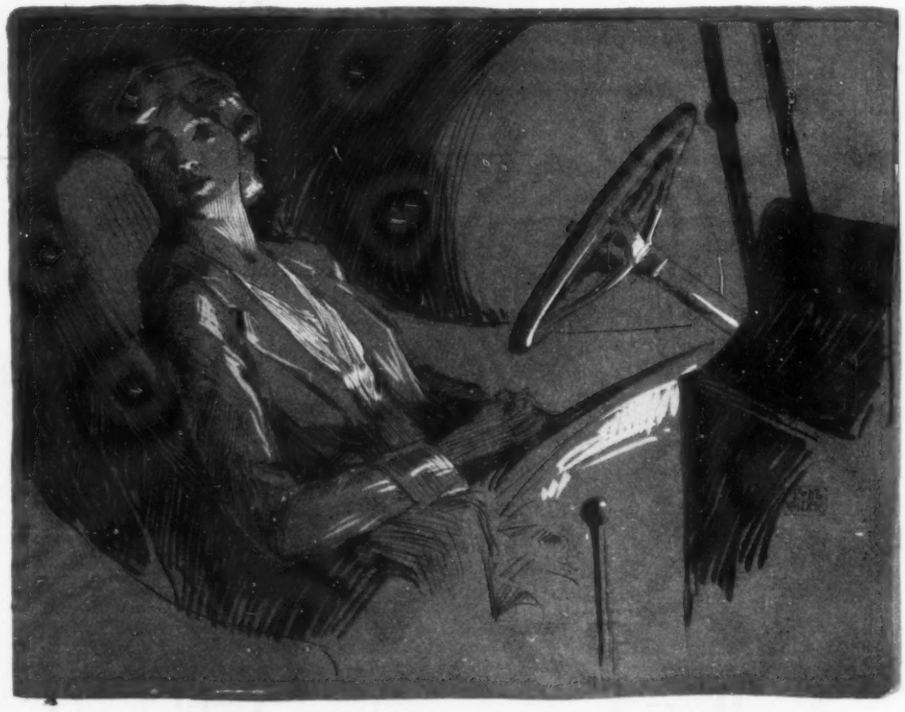
"Did you ever notice how everybody around there is always on the jump? No slow walking around that place. In Bill's dictionary service means quick service, and no slow motion is allowed.

"I always enjoy driving up to that curb gasoline pump. That young attendant has my filler cap off and the pump working almost before my car is stopped. He's always there, ready. And he has the tools to remove any filler cap—no time wasted borrowing a wrench from the owner. It's a 5-gal. pump too and he operates it with an energy that is fascinating.

"His wash and polish is perfection itself, and it's the only place I know where you really can get you car cleaned.

"Then, think of the two lounging rooms for men and women, with their hot water and spotless, white towels to remove the grime of the ride.

"I didn't mean to go so far into detail, but the difference between Bill's place and the one we have to put up with out here makes me homesick."



She never had to fill the radiator or see if the tires were pumped up right in town—Bill Strong did that

DAILY COST OF TRUCK

Philadelphia, Pa., April 18—Although George H. Pride, president of the Heavy Haulage Co., New York, was unable to be present to speak on transportation problems before the Motor Truck Owners' Association of Philadelphia, at its monthly meeting, deep interest was evident in the proceedings, especially with reference to a report on a questionnaire sent out by a committee of the association for the purpose of determining the cost of operating, in the Philadelphia district, five-ton gasoline trucks.

The report, read and explained by C. B. Montgomery, transportation expert of the Union Paving Co., which operates a large fleet of dump-body trucks, said that a 5-ton truck meant all trucks designed and generally used to carry a load of more than 4 tons and less than 6.

The summarized result, over which there was an interesting discussion, is as follows, taking the figures of eight different operators employing more than 100 trucks, all told, over an average distance of 40½ miles a day:

Average Daily Cost of Operation

Depreciation	$ 5.29
Interest	.76
Insurance	1.25
License	.11
Gasoline	3.42
Oil and grease	.42
Repairs	5.11
Garage fees	.74
Overhead	1.74
Driver	4.96
Tires	2.29
Total	$26.09

FARM TRACTOR AT $755

Detroit, April 18—The Detroit Culto-Tractor Co., a new company incorporated at $1,500,000 for the manufacture of a farm tractor to sell at $755, has leased the Indian Village garage and is converting the place into a manufacturing plant. The company plans to be in production by May 1, turning out twenty-five machines daily. It states it has orders for 3700 machines.

The company will not go into the manufacturing end of the business heavily at first but will confine its efforts to assembly, some machining and finishing work. The officers are: President, J. J. Rowe; vice-president, H. M. Jerome; second vice-president, H. B. Kramer; secretary and treasurer, P. H. Kramer. S. M. Duffield is sales manager and S. R. Du Brie, chief engineer. Mr. Jerome will be production manager.

WINDING UP ROSS

Detroit, April 18—H. D. W. MacKaye, temporary receiver of the Ross Automobile Co., has filed his final account showing total receipts and disbursements for the company, and the affairs of the bankrupt concern are to be wound up finally April 23. The plant was sold in January of last year and at that time it was expected the proceeds would permit paying the creditors 100 cents on the dollar. The Fisher Body Co. leased the plant after its sale. The equipment and stock of the company were sold last May.

TAXI JOBS FOR MEN IN SERVICE

Chicago, April 18—Returned soldiers and sailors who can drive cars are being given jobs by the Shaw Taxicab Co. Not only have the positions of the 400 employes who went into service been held open, but the company has found positions for 173 other discharged Army and Navy men. The company finds that returned soldiers make especially good taxidrivers.

Garage Planning
Service Station Arrangements

No. 37

Q—We contemplate erecting a one-story brick building 60 by 85 ft. to be used as a service station for new car sales, as well as for the general public. We have another building for showroom. We also have a battery department that we want to house in the same building as the service station. We would like this garage planned to give our customers the most efficient service. We expect to employ from three to five men. The attached sketch shows the location of the plot on which we expect to build.—Leach & Christenson, Hartford, Wis.

This layout is designed to give the best possible service to your customers as you requested. We have added a tire repair department, as well as a battery department. We would think you would be able to do enough of this business to pay well.

We also have supplied a small office for the foreman, handy to the entrance, so that he can look over cars that come in for service without undue delay, diagnose their troubles and make out the proper orders, etc. Of course, the foreman of a station of this size will not spend all his time in the office, in fact, very little of it, but it will be a place for his records and where he may have a clerk to help if business gets very brisk, as it probably will during the summer months.

Machine shop arrangement is quite complete, the shop being partially separated from the repairshop proper, where overhauling is done. This in turn may be shut off by sliding doors or open into the main garage. We recommend the former arrangement, as being better in that it will keep garage patrons from interrupting the workmen.

No. 38

Q—We would like to have a floor plan for the first and second floors of a garage we propose building on a lot 103 by 134 ft. This location being in the residential section, we propose to set the building back 10 ft. and leave a space on the inside of the lot 10 ft. wide, the entire length of the building. We want to make this building very picturesque. For instance, we will have flower beds in front and on the side, and by setting the building back on the side no one can build near us and we also can have plenty of windows.

Our business is devoted entirely to the sale of Buick and Garford trucks. We sell about 350 new Buicks a year and trade in for possibly 75 or 100, which means that we have that amount of used Buicks to sell.

We want a salesroom sufficient for new Buicks and separate salesroom sufficient for used Buicks—we repair, repaint and retrim where necessary, all used cars—and a salesroom for Garford trucks. We carry in stock about $30,000 in parts, we are jobbers on tires, we sell accessories to the extent of bumpers, spotlights, Macbeth lens, Moto-Meters, tire covers, radiator hood covers and such things as we can equip on new cars when sold. We do not handle a general line of light accessories. We employ four salesmen on cars, two on trucks, have two stockmen, bookkeeper, two stenographers, shop foreman, working fifteen mechanics and helpers.

We have an idea that we should have two salesrooms on the front of the building for new cars and trucks and a salesroom on the front on the second floor, not the entire width of the building but about half of the front end. Our services will comprise painting, retrimming, as well as a general overhauling of cars. We had thought of putting the entire parts department on a mezzanine floor the entire width of building just back of salesrooms, with general offices below mezzanine, including a spacious private office for the president.

We are inclosing a plain pencil sketch, showing location of building site, specially with regard to the streets, particularly showing the most prominent street that everybody drives.—Motor Sales & Service Co., Norfolk, Va.

In your letter you say nothing about storage, so we infer your business does not include this. There is plenty of room in the back part to store all the cars awaiting repairs and finished cars awaiting their owners. The showroom is large enough to display all the Buick models. No dividing wall is shown between the truck and car sections, as we think the impressiveness of the large room more than offsets any sales disadvantage of having both together. Two cars across the width of the room will form sufficient division.

The elevator is so it can be used to carry stock to the mezzanine floor and fills the passageway between the showroom and garage, so this is not dead space. Elevator and stairway lead almost directly to used car showroom, making it unnecessary to lead customers through shops or repair rooms.

While the location of the accessory store on the side street is not specially good, it would cut down the showrooms too much to have it in front. Its position under the balcony makes communication with the main stockroom handy by dumb-waiter and a convenient stairway.

On the display side of the mezzanine floor, windows of some kind of translucent or opalescent glass will allow all the light necessary to pass to the parts bins and still hide them from view.

There is room for a larger office for the president if the space allowed seems insufficient. Your office force is not large and the salesmen's desks are in the showroom, as is usual.

The ramp is shown in an auxiliary sketch. It will not affect the lower floor plan much but will necessitate some changes on the second floor, moving the trim department, etc.

Motor Age is receiving many inquiries for garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and inquiries are urged in asking for such plans to be sure to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

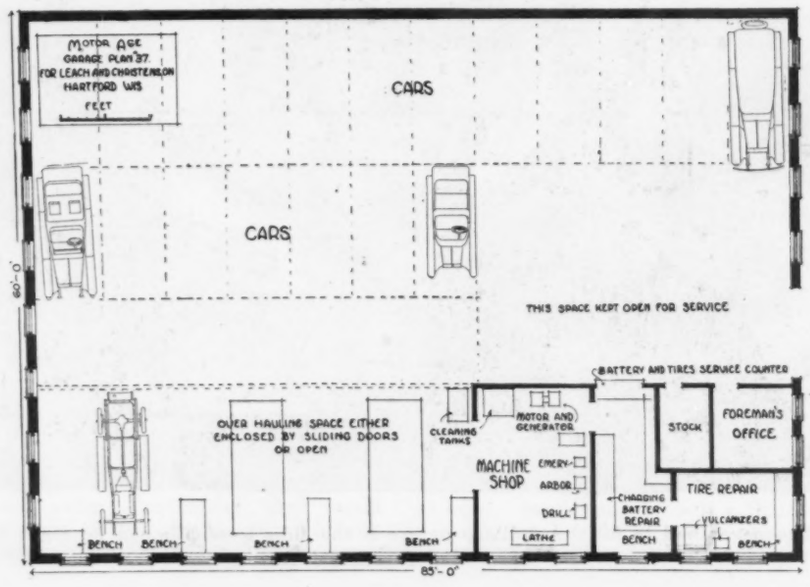
Number of cars it is expected to garage.

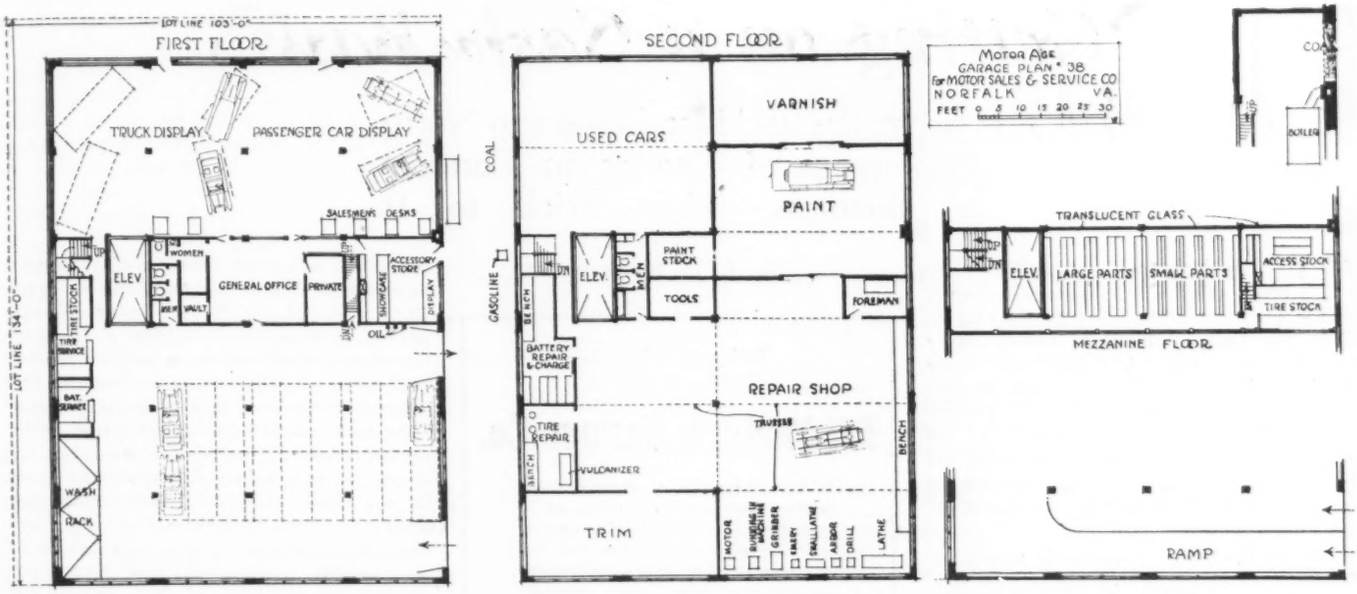
Number of men employed in repair shop.

And how much of an accessory department is anticipated.

No. 39

Q—I have a corner lot 50 by 100, on which I expect to build a garage this spring. I want an attractive filling arrangement on the corner, equipped to accommodate two cars at a time; showrooms for cars and accessories and a parts stockroom. I am thinking of having a double entrance on the side street for cars, with no entrance on the front street for cars. I can





also have an exit at the rear for cars. It is my intention to have a repairshop in the rear.

I have been thinking of building walls 16 ft. high and having an upper deck over the shop for tire repairing and other things. Would 16 ft. be high enough for that? I want to get all the space I can for the size of the lot, but I must have a convenient filling station on the corner.—W. D. Bateman, Italy, Tex.

It was very difficult to decide from reading your letter whether you wanted a filling station where cars could drive in or not. We finally decided, however, that what you wanted was good pump locations and a filling station office. If we have misunderstood you, we shall be very glad to redraw the plan. We should like to point out that to provide sufficient space on the corner of your plot so that two cars may drive in will so reduce the remaining space that your building will not be very satisfactory.

We have provided two pumps on the side street so placed that they will not interfere with the cross walks and will accommodate three cars at one time. The filling station office can be used to store and as a place for the man who has charge of the pumps to stay. Oil and gasoline tanks are under the sidewalk with filler caps in the sidewalk near the curb and oil pumps inside the office.

We do not advise a double entrance on the side of the building. A single entrance is quite sufficient for a building of this size.

The showroom will accommodate two cars very nicely and three cars if necessary. The accessory store is placed in an alcove at one side of the showroom. At the front is a small accessory display window. The display in this window should be changed once a week.

A series of sliding doors are used to separate the shop from the garage. This arrangement allows you to drive a car directly into the space in the shop it is to occupy.

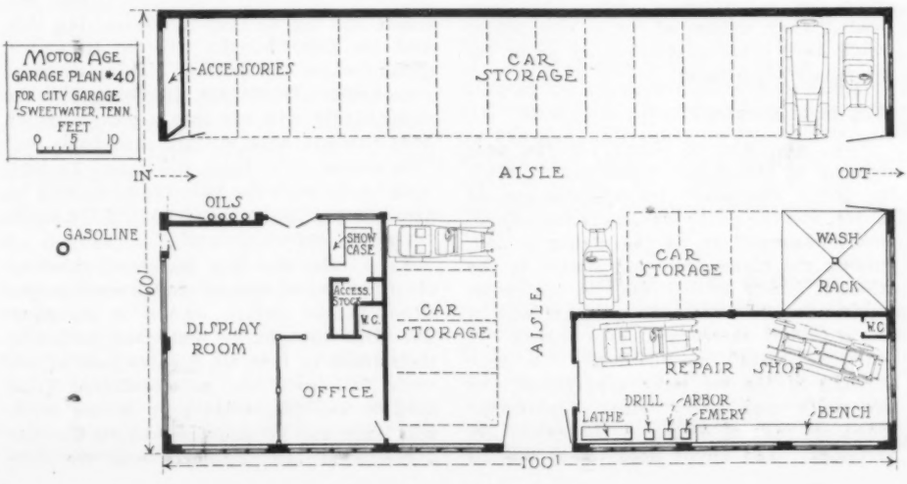
The furnace room and coal storage room are shown in dotted lines. They are lighted by sidewalk lights.

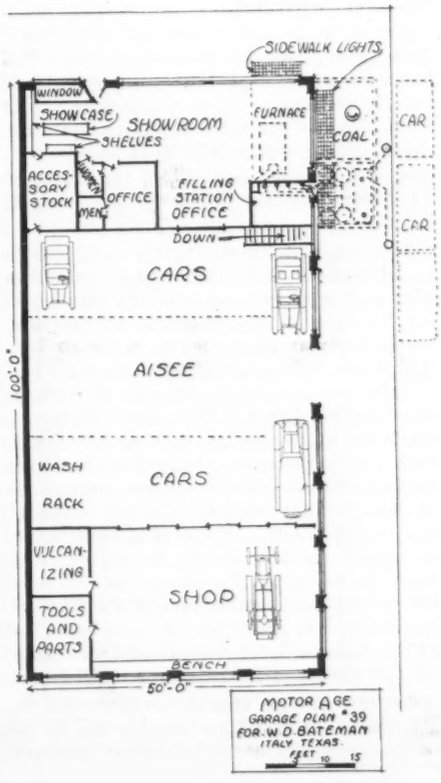
No. 40

Q—We would like a plan for a garage to be built on a lot 60 by 100 ft. with alley 15 ft. to be left on one side and also an alley in the rear. This is to be a one-story building. We would employ four men in our repairshop and would also want a good-sized accessory department. We need display room for two cars and space for about twenty-five cars for storage. A rough sketch of the lot is attached.—City Garage, Sweetwater, Tenn.

There is considerable difficulty in designing a garage of the proportions you name which will accommodate twenty-five cars and the departments you want. We have succeeded in getting in twenty-four and room for two or three in the repairshop. With an entrance on both alleys there should be no congestion though the aisle is pretty narrow.

There is no provision for part storage, and very little for accesories. If you do much service work, you probably will need more space, and if the height of your roof will permit, as it probably will, the ceiling of your office might be lowered enough to leave a good loft between with a stairway in the space shown as necessary stockroom. No trusses would be required in this part. The accessory show window is placed on the other side of the entrance because it is a good way to utilize this space. It would ruin the display room to have it there.





Getting on a Cash Basis

Advertise and Use Letters to Notify Customers of Change in Conduct of Business—Then Stick to It

By T. P. Bowman

"HOW is business?" is the question often asked of the garage manager, owner or whoever happens to be responsible for business, and in nearly every instance the answer is "fine" or "very good, considering conditions," and in reality the man who says it makes the remark conscientiously. For eleven months of the year he rests easy and contented with the business done, and awaits the end of the last month, anxious to read the report of the year's profits.

Finally the year's business is placed before him in figures which are not an estimate but an actual statement of the profits of each department summed up to represent the profit of the total business, and what a surprise they sometimes are.

At a first glance Mr. Manager is up in the air and his first thought is to tack a "For Sale" sign on the front door of the place which would hide the Rock of Gibraltar. But before doing this he again seats himself in his chair and gives the report a little study. His first thought, perhaps, is to discover who is to blame for the existing condition and replace the guilty party or parties with efficient help. "Why," he remarks in the height of excitement, "we have done a larger business this last year than we have done in preceding years, and we have barely made expenses in comparison to the profits of former years."

Business Is Greater

He turns to the report of the repair department, which shows that its total business is 50 per cent more than the year before, and the profit is no greater. It is a peculiar and sad state of affairs, but after checking the report it is found to be correct, and, further, it discloses the secret of no profits for the 50 per cent business increase.

First to catch the manager's eye, "credit by adjustment, $15." Prying into the day slips and memorandums for the day bearing the date of this particular transaction, he finds that about seven weeks before this credit was issued John Jones had had certain repairs made on his car which amounted to $30.50. Then after trying to recall the particular transaction, he remembers the occurrence very clearly. After having sent Mr. Jones several statements of his account without having received any reply, to say nothing of a remittance, he called on Mr. Jones, in person, and after listening to Mr. Jones' tale of woe the account was cut in two and a $15 credit issued, which, with Mr. Jones check for $15.50, balanced the account and cleared it off the books.

As the garage manager remembers it, Mr. Jones claimed that his car was in no better condition after he had it repaired than it was before, and that it was necessary for him to take it to another garage before he could use it with any satisfaction. The manager also remembers that Mr. Jones did not return to the garage with his car, nor had he returned to register any complaint, not even after several reminders of his unpaid account had been forwarded to him. The affair did not have a good appearance, but, as the manager would say it, "anything to get it off the books," so the amount was split in favor and Mr. Jones and he hadn't seen the cutomer since. In fact, Mr. Jones was no longer a customer, just a remembrance of one and one of the many characters who helped to make up the reason for big business and no profits. Mr. Jones was not the only one; there were others. In fact, after the adjustments alone had been totaled they amounted to a sum which would have made a satisfactory profit for the repair department.

ON and AFTER
JUNE 1, 1919
The Modern Garage Co.
Will operate on a strictly cash basis. This move is taken as a necessary step toward reducing our office force to a minimum and increasing our service to a maximum. On and after June 1 every member of our concern will be a service unit at your command.
Demand 100% Service
and
Get It!
at
The Modern Garage Co.

Specimen advertisement to announce change to cash basis

Why Poor Showing?

Now, who was to blame for the poor showing of the repair department? Why, the party who made the adjustments, of course, and the party who made the adjustments happened to be the manager, and, passing the blame from one source to the other, it finally settled itself in the credit department, of which the manager was in charge. And there the blame rested. It could be traced no further. The poor showing of the accessory department, the tire sales and every other department found its seat of origin in the credit department. The credit department was to blame for the poor showing of the entire business for the entire year, and the question arose as to the efficiency of that particular department. After a thorough investigation of credits it was found that each of the credit customers had the best of credit references as per the judgment of the retail dealers' credit association, which consisted of grocers, clothiers, etc., but which did not include the garage business. It was found that car owners would pay their grocery bills, dry goods bill and clothing bill promptly at the termination of their credit period, but they would pay no attention whatever to their garage bill. Car owners would not dispute their grocery bill because they knew they had received the goods and unless they paid for them promptly their credit would be questioned. However, it appeared that it made little difference with their garage credit. They would ignore the claims of one garage and go to another, and from all appearances made a practice of going the rounds, figuring that the garage was entitled to only what could be extracted from their purse by force.

It must be understood by the garage owner, manager and other executives that the popular prices for repairs warrant only a reasonable margin of profit and if that reasonable amount of profit is to be shaded off by adjustments and refunds it soon upsets the foundation for the basis of profit. Only one of two things can be done to assure the garage of its proper profit: the cost of repairs must be increased to allow for a certain amount of loss by refunds and adjustments, or the cash must be obtained for the repairs or merchandise before the customer leaves the place.

Charge Injustice to Customers

To increase the cost to overcome the loss is an injustice to your customers who pay their bills promptly, because it means that the man who pays his account also pays the deadbeat's account. The customer will not be long in discovering this, and his first thought will be to find a garage where the costs of repairs are more reasonable. Of course, in doing this he undoubtedly will run into a garage which does business on a strictly cash basis, but this makes very little difference to him, because he pays his bills promptly and he also knows that he is not paying for someone else's unpaid account.

As a rule, the first party to raise an objection to "a strictly cash basis" proposition is the garage owner or manager. The first thought is that they will lose their trade or that the greater part of the trade will leave and go elsewhere. It is hard to say just what part of the trade will leave and go elsewhere unless one has a record of the customers who are slow

in paying their bills or who don't pay them at all. If this record is available, it can be estimated that nearly all those customers will leave, and when they do the garage manager again can sit at ease and issue a great sigh of relief, feeling that every transaction turned during the day has done its share toward filling up the profit side of the ledger.

Transferring from a credit basis to a cash basis requires considerable preparation, and unless judgment is used the trade is very apt to misconstrue the intent of the change.

At least a week before the change would be the proper time to mail a personal letter to each one of your customers, announcing the fact that no one will receive credit on and after that date. As a suggestion for a letter which would be entirely proper for the occasion, a sample is given. It will be noticed there are no words or phrases which would in any manner cause the customer to take offense, and it explains the reason for making the change.

A great mistake is made by many concerns in leading the public to think their reason for wanting the cash is principally because they need the cash. Of course, it is quite evident the cash is needed, but it should not be represented to them in that way. As will be noticed from the letter, the customer conceives only the idea that he will receive more for his money by paying cash than if charge accounts were to be tolerated. He readily sees the writer is truthful in his statements when he says that the man who pays his bills also is paying the bills of the fellow who never pays them. He also knows this is true if the garage is making sufficient profit to insure its existence. The same will be taken from the advertisement, which also is illustrated. While it is a quarter-page advertisement, very few words are used to express the intention of the writer.

For the occasion it would not be advisable to use less than a quarter page, and a half or full page would be better. The advertisement, unless it is read by all readers of the paper, is money wasted, and the only way to be certain that it will be read by everyone is to use enough space to prevent its being overlooked, and, next, write it attractively and different from the usual run.

Then, having given due notice of your intention of going on a cash basis, do it and stick to it.

THE MODERN GARAGE CO.
CHICAGO

Dear Sir:

Your prosperity is in your own hands!

Our prosperity is also in your hands!

For unless we can give you the best there is in SERVICE we cannot prosper. But we will prosper because we will give you the best there is to be had in our line, and give it to you, and to every one of our patrons, at the lowest possible figure.

The lowest possible figure is a CASH figure, and a cash figure is the only guarantee a customer has of knowing he is paying his own account only, and not that of the man who doesn't pay.

There must be a reasonable profit in doing business or business must vanish. The foundation of our business is SERVICE, so if our business vanishes, our service which is YOUR service also vanishes.

We believe you will see the object of our decision and we also believe you will take advantage of our better service and reasonable prices which could be arrived at in no other way than discontinuing credit and adopting a strictly cash system. This takes effect June 1, 1919.

Yours for service,

THE MODERN GARAGE CO.

Specimen letter notifying customers of change in method of conducting business

REO USES TRUCK LINES

Lansing, Mich., April 18—Reo is about to establish a truck line between Lansing and Muskegon, 105 miles, for quick delivery service on castings. While the roads in some sections of this route are rather poor, the company will use heavy trucks owing to the bulkiness of the material and the body room offered by the larger type of truck.

This company has been forced to prove much that has been claimed by the highway transportation committee of the National Council of Defense relative to the motor truck as an economical solution of the short haul express. Owing to a shortage of malleable castings the company has been compelled to establish its own motor express between this city and Albion.

Minute data covering everything from oil tire and other depreciation to gas, driver's wages, etc., are being kept by the transportation officials and a saving of $17 a trip has been shown. Each truck is of the speed-wagon type, carrying an average load of 2650 lb. The distance to Albion is 41 miles. Two trips are made daily, a round trip consuming 4 hr. 15 min.

SELDEN 1½-TON MODEL

Rochester, N. Y., April 18—The Selden Truck Sales Co. will commence deliveries of its new 1½-ton worm drive model April 21. It is equipped with a 3¾ by 5 Continental engine with high-tension magneto and Stromberg carbureter. It is to sell for $2,185. Tires are 34 by 3½ single front and 34 by 5 single rear; pneumatic equipment is extra. The wheelbase is 140 in. and the length of the loading space 9 ft. 6 in.

G. M. GIVES L. H. $100,000

Detroit, April 18—The Lincoln Highway Association has received a donation of $100,000 from General Motors. The money will be spent in building four or five short stretches of unimproved road between the two coasts which require outside aid. Two of these bad pieces are in Nevada. The desert section and the Fisher Pass section in Utah, financed by the Goodyear Tire & Rubber Co., F. A. Seiberling, president of the Lincoln Highway Association, and Carl G. Fisher, vice-president of the association, to the extent of $125,000, will be completed by July 1.

TRAFFIC TO BE HOST

St. Louis, Mo., April 21—The Traffic Motor Truck Corp. has invited 1000 automotive dealers to visit this city May 9-10 as its guests. The object is to have them visit the new plant of the corporation, where fifty trucks a day will be turned out.

MONARCH BUYS ANOTHER PLANT

Watertown, Wis., April 18—The Monarch Tractor Co. has purchased a plant at Paulsboro, N. J., where it will take up the manufacture of its tractors in addition to the manufacture at present being carried on at the home factory in Watertown and the Canadian factory in Branford, Ontario. In the Paulsboro plant there will be a capacity of ten a day of the two-plow Lightfoot model which has a 12-7 hp. rating. The Watertown plant is running at six a day and the Branford plant at four a day, so that with the three in production there will be a capacity of twenty a day.

Monarch is bringing out a new two-wheel garden-type tractor which is expected to list at somewhere between $300 and $350.

Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the 143d installment of a weekly series of articles begun in MOTOR AGE, *issue of June 29, 1916, designed to give the repairman and motorist the knowledge which will enable them to care for and repair any and all of the electrical features of the car, no matter what make or model it may be.*

The first half of this series has been published in book form by the U. P. C. Book Co., Inc., 243-249 West Thirty-ninth street, New York, and is sold at $2.50. The remainder of the series will be published as a supplementary volume.

Part CXLIII—Simms-Huff Electrical Systems

REGULATION is accomplished by the vibrator points of the regulator alternately cutting in and short-circuiting the field resistance on the dash panel. With regulator points closed, the field circuit of the generator is from terminal No. 2, Dan.+, on the fuse block, through the regulator arm; across the points to terminal No. 3, Field, on the fuse block. From here follow circuit No. 3 to No. 3 on the electrical unit; through the shunt windings to ground on pole piece No. 3. With the regulator points open the field circuit is from terminal No. 2, Dyn. +, on the fuse block through the field resistance to terminal No. 3, Field, on the fuse block and follows circuit No. 3 as before.

The lighting circuits may be traced by reference to Fig. 699.

The lighting switch spider is shown in the off position in Fig. 698 with spider arm N in contact with point A on the back of the lighting switch and with arms, B, C, D and E free. The lighting switch spider in the complete dash panel of the diagram above is in the dim position. In this position, spider arm B is in contact with point A, arm E is in contact with point F, and arms C, D and N are free.

When the generator is not charging the storage battery, current is supplied to the lighting and horn circuits by the storage battery and is delivered to the switch panel from terminal No. 6 on the starting switch to terminal No. 6, Bat. +, on the fuse block through the bus bar to terminal No. 5, Horn. When the generator is charging the battery, current is supplied by the generator to terminal No. 2, Dyn. +, on the fuse block, across cutout points, through the series coil of the regulator to terminal No. 2, Bat. +, on the fuse block and as before to terminal No. 5, Horn.

The lighting circuit with the spider in dim position is from terminal No. 5, Horn, to point A on the lighting switch, through spider arms B and E to point F on the lighting switch. The headlight circuit is then from point F on the lighting switch through the headlight dimmer coil to point G on the lighting switch, to the center of the bus bar connecting the right and left headlight fuse clips, through the fuses to terminals No. 4 and No. 7, right and left headlights, respectively, through circuits No. 4 and No. 7 to right and left headlamps, respectively, and to ground. The taillamp circuit is from the point F on the lighting switch to the taillamp fuse, through the fuse to terminal No. 8, Rear and Dash, on the fuse block, from terminal No. 8 on the fuse block to the dashlamp and ground, also through circuit No. 8 to the taillamp and ground.

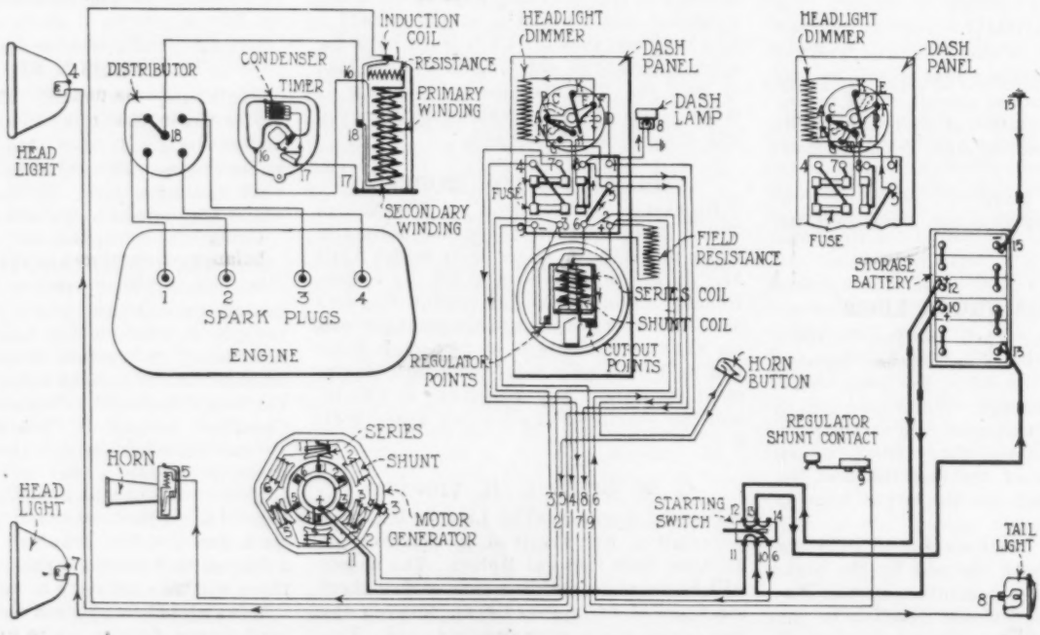


Fig. 699—Wiring diagram of the Simms-Huff on the 1917 Maxwell, two positions of lighting switch

The Motor Car Repair Shop

Practical Maintenance Hints

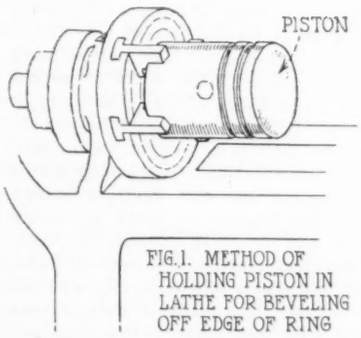


FIG. 1. METHOD OF HOLDING PISTON IN LATHE FOR BEVELING OFF EDGE OF RING

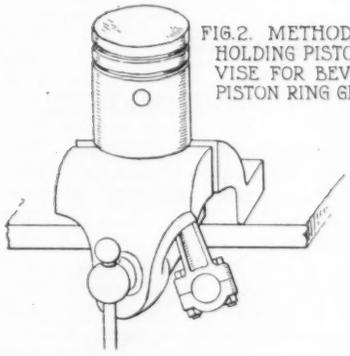


FIG. 2. METHOD OF HOLDING PISTON IN VISE FOR BEVELING PISTON RING GROOVE

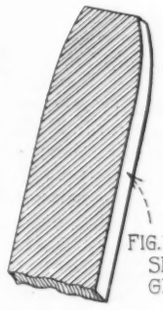


FIG. 3. EDGE CUT SMOOTH ON GRINDER

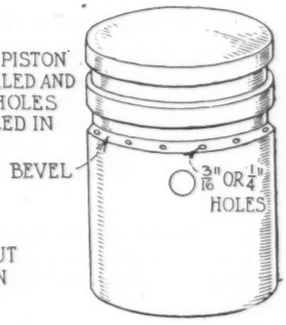


FIG. 4. PISTON BEVELED AND ALL HOLES DRILLED IN

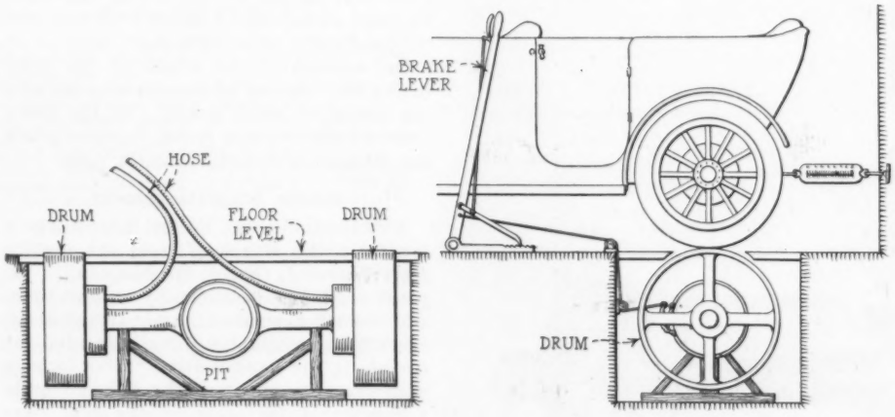
To Cure Oil-Pumping Engine

EXPERIMENTS of every description imaginable have been attempted in the way of curing oil-pumping engines, but the results obtained from the whole point to the following method as being the most satisfactory, that is, where grinding or reboring of the cylinder accompanied by a new piston is not desired for certain reasons.

Place the piston in the lathe, or if a lathe is not at hand the connecting rod and piston assembly may be clamped in the vise as shown. If the work is done in the lathe, the piston will be revolved and a safe-edge file is placed in contact with the lower edge of the second piston ring groove at an angle of 45 deg. This will remove the material at that point, and enough material should be removed so that the width of the beveled edge will equal the width of the piston ring groove. In the case of performing this operation in the vise the piston must be evenly filed until the same results are obtained. If a safe-edge file is not available, an ordinary flat file may be cut smooth on one of its thin edges by grinding it down on the emery wheel.

With the piston beveled in this manner, the next step is to drill a series of $\frac{3}{16}$, or $\frac{1}{4}$, in. holes along the center line of this bevel.

When the piston comes down on its downward stroke the sharp edge of the piston ring serves as a scraper and the oil collected on the cylinder walls is cut off partially and permitted to run from the outside of the piston through the small holes of the groove to the inside of the piston and then back to the oil reservoir.



Drum Car Tester

A DRUM car tester solves the problem of shop testing. Otherwise a car cannot be tested properly in the shop, though if it is tried out on the road there are many objections. By using a drum tester there is the advantage of being able to measure the pull at any speed and thus check succeeding adjustments.

The drum tester is easy to make. It consists of two drums, or pulleys, on which the rear wheels of the car rest; a strong spring balance attached to a nearby wall or post, to measure the car pull, and a brake which allows adjustment of the load from the driver's seat. The drums are belt pulleys about 3 ft. in diameter—second-hand ones will do—and are bolted to an old axle, taking the place of the wheels. The brake lever, which is level with the driver's seat, operates the brakes on the axle. The axle is carried on a substantial wooden framework. For simplicity, no brake-equalizing mechanism is shown in the sketch, but this should not be omitted.

Here is the way it works. Suppose it is desired to adjust the carbureter to give greatest pulling power at moderate speeds, say 20 m.p.h. The hand throttle is opened wide and at the same time the brake is set up to such a point that the speed is roughly that which corresponds with 20 m.p.h. This will have to be estimated unless the speedometer is driven from the propeller shaft or provision is made for driving the right front wheel by drum also. The pull on the spring balance should be noted.

By varying the adjustment of the carbureter and leaving everything else alone a point will be reached finally where the pull on the balance is a maximum. This is obviously the most powerful adjustment for that speed. Best adjustments for other speeds may be obtained in a similar manner. If the speedometer is able to register, then it may be used in place of the spring balance, maximum speed being used as an indication in place of maximum pull, that is, maximum pull for that particular throttle adjustment.

There should be an auxiliary means of tieing the car to the wall so if the spring balance should break, the car would not move more than a few inches before coming to a stop, restrained by this anchorage.

If the brakes are to be applied for more than a moment at a time it will be necessary to play a strong stream of water on the brake drums to prevent them from overheating. It is suggested a hole be drilled through the dust cover on each side of the axle and the water played on the drum interior.

It is possible to use this apparatus for determining the brake horsepower delivered to the rear wheels, but it is not believed the average repairman will be interested in this, since the pull on the spring balance gives him all he needs to know to make adjustments.

The Readers' Clearing House

Questions and Answers

Conducted by B. M. Ikert

Hudson Patent Number

Q—What is the patent number of the Hudson crankshaft?
2—What is the address of the Aland engine?—Pere Wickes, Port Royal, S. C.

1—The Hudson crankshaft patent number is 1165861.

2—We have no records of the Aland engine.

Reader Wants Car Speeds

Q—What speed can the following cars make with regular gears, Thomas Flyer 6-60, Locomobile 4-48, Packard 6-48?—C. W. Wiseman, Proctor, Minn.

The speed depends on so many factors it is hard to find two cars of the same make even that can make exactly the same time. Among these factors are, naturally, general condition of the car mechanically, ability of driver, road conditions, etc.

Wants Racing Information

Q—What is the maximum revolutions per minute of the Herffs-Brook six-cylinder engine?
2—What is the difference between D6 and DU6 Bosch magneto?
3—Which is better for racing purposes?
4—Publish address of the Indianapolis Speedway Association.
5—Is 339-cu. in. piston displacement allowed for 500-mile races?—Stanley Malicki, Hillsboro, Kan.

1—About 1950 r.p.m.

2—D6 indicates straight ignition from magneto only. DU6 indicates ignition from magneto or coil.

3—The simple magneto system offers less complication than the double system, although it may present more difficulty in getting the engine started.

4—Indianapolis, Ind.

5—If the race is a free-for-all, with no restrictions limiting piston displacement, then 339 cu. in. is all right, but 500-mile races generally have the 300-cu. in. limit.

Miscellaneous

Play in Clutch Lever

Q—I am having considerable trouble in changing gears on a 1915 model K Hupmobile. The clutch stops too suddenly; clutch shifter is metal to metal; how can my trouble be remedied? There is no thrust bearing in clutch shifter on that car.—John Crawford, Altoona, Pa.

There is a possibility that because of excess play in the clutch lever you do not separate the clutch plates thoroughly when disengaging the clutch. It is true there should be a little play in the lever, so it will not bind and cause the clutch to slip because the plates cannot come together. From under the car take up all play in this lever except ¼ in., that is, permit the clutch throw-out lever to have a free movement of ¼ in. at the floorboard.

Also try cleaning out the clutch with kerosene oil. Every 1000 miles or so the oil should be drained and new oil put in the oil pan. Before the new oil is put in, the crankcase should be washed with a gallon of kerosene, letting the starting motor turn the engine, but with ignition turned off. While this is going on, work the clutch lever back and forth to permit the kerosene to wash the plates. You will find this will clean the plates and when the new oil is inserted the clutch will not only release better but will hold better when engaged, strange as this may seem.

If this treatment, so far, does not produce a remedy, there is a possibility the little bent ears on the edge of the clutch plates—that are there to separate the plates—may have become broken off, thus permitting one side of the plates to lodge and thereby cause a dragging clutch. If this is the trouble, it means to replace such plates as are found to be broken.

Trouble with Rear Spring

Grand Junction, Col., Editor MOTOR AGE—In your issue of March 27 I note H. T. Bollot, Clinchburg, Va., is having trouble with Hupmobile 32 rear spring. I formerly owned one and had the same trouble and remedied it as follows:

I placed an oak block in the full length of channel in rear cross member of frame and bolted to this on the under side a rear cross member of a Ford car, and used a Ford rear spring by shortening the main leaf and second leaf 1 in. on each end, and returned the eyes in main leaf.

On account of the shape of the Ford spring the rear end of the car is raised and the car rides much easier. In the three years of service this spring has not given one moment of trouble.—Austin West.

Reader Suggests Remedy

Richwood, W. Va., Editor MOTOR AGE—I note in the March 27 issue the inquiry from Walter J. Owens, Washington. I experienced this same difficulty several times and was much puzzled. After trying about everything imaginable I finally located the trouble in the Bendix drive pinion locking with the gear on flywheel. I found quite a number of the teeth on the gear were burred on the edges, and after filing same smooth I had no recurrence of the trouble.

I do not know whether or not the particular car mentioned by your correspondent is equipped with the Bendix drive and therefore simply pass this along for what it is worth and in the hope that it may be of some value.—C. B. Brooksbank.

Another Hint for Owens

Fort Benton, Mont., Editor MOTOR AGE—In the March 27 issue Walter J.

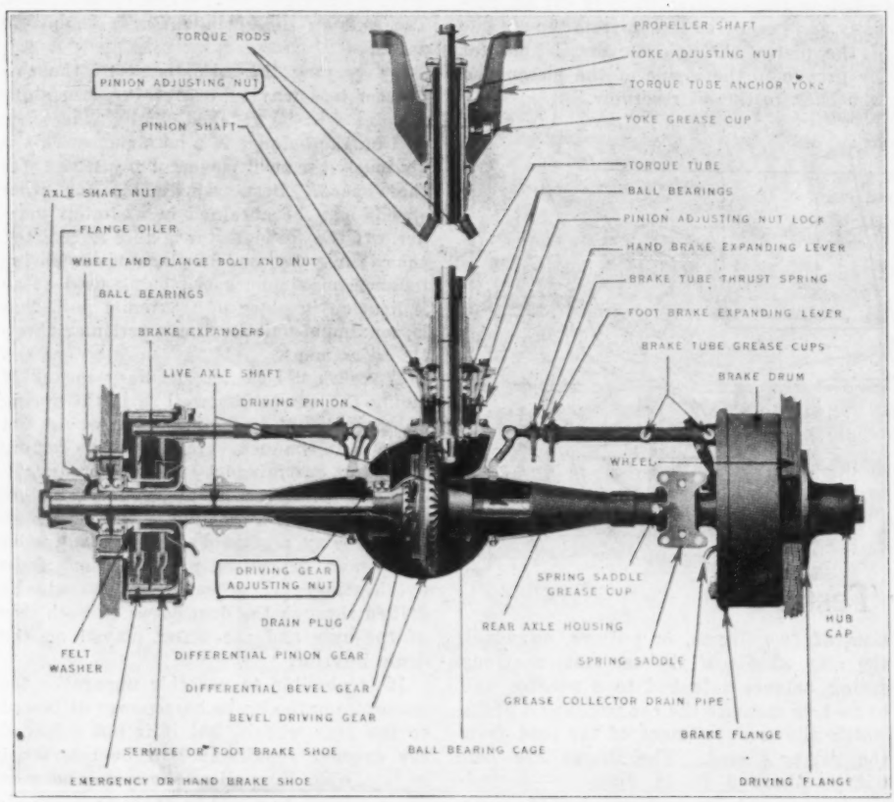


Fig. 1—Rear axle on Lozier car, showing points of adjustment

Owens, Washington, asks for information in regard to the engine of his Paige 6-46 on which the starter would not turn over nor could it be cranked by hand. The information he gave was very meager, but I have had the same experience on different makes of cars so I may be of help to him. The trouble lies in the gear on the starting motor shaft. The gear has become wedged in the flywheel gear and it is impossible to turn the motor over until it is released. It is very probable the Bendix shaft has been oiled and the oil has gummed up the screw, thereby hindering the gear from being thrown out of mesh completely when the motor starts. If Mr. Owens will clean off the starting motor shaft with kerosene, and not oil it, as it is intended to work dry, he will eliminate his trouble.—Thomas Kirkwood.

Clutch Thrust Bearings

Lebanon, Ind., Editor MOTOR AGE—I saw in MOTOR AGE answer in regard to getting to clutch thrust bearings on Maxwell and think I can give you a much easier and quicker way, as I was in the service department of this company for a few years and know most of the short kinks.

First remove the four studs that fasten the propeller housing to rear axle, and with a screwdriver push housing and driveshaft away, tilt axle forward, which will let the housing and shaft come out of universal in front, remove emergency brake lever, also foot brake pin and all wire connections, take off small cover in front of shifter and remove the three clutch springs, take out bolts that hold the housing to engine, and lift the whole thing out complete with clutch. This will leave only the clutch spider to remove to get to the bearings. This can be removed by one workman in very short time. It is impossible to remove this case without first removing clutch springs.—A. E. Fields.

Wants Varied Data

Q—In rounding a curve does one or both wheels pull? Explain how differential works in a case like this.

2—Publish drawing of device that keeps storage batteries from being overcharged.

3—Are valves ground by hand more practical and satisfactory in regard to results than when ground by an electric valve grinder?

4—Is there a certain residue in present-day gasoline that gets by piston rings and ruins oil in crankcase?—William Young, Carlinville, Ill.

1—Both wheels pull in round a curve, but the outer wheel does the most of the work. If the car turned in so short a radius that the inner wheel stood still, then the outer wheel would turn twice as fast as it ordinarily would if both wheels had equal traction.

2—We do not know of any extra device on the market to keep storage batteries from being overcharged. All cars with electrical generating outfits have a regulator of some sort. Thus Delco employs the third-brush system, which regulates itself automatically. Systems with differential-wound generators regulate themselves inherently. Other systems use a shunt-wound generator and employ a regulator which automatically inserts and withdraws a resistance from the field circuit, according to the speed and consequently the voltage which the generator tries to produce.

TO assist readers in obtaining as a unit all information contained in this department on a certain subject MOTOR AGE segregates inquiries into divisions of allied nature. Questions pertaining to engines are answered under that head, and so on.

MISCELLANEOUS

Pere Wickes.....Port Royal, S. C.
C. W. Wiseman.....Proctor, Minn.
Stanley Malicki.....Hillsboro, Kan.
John Crawford.....Altoona, Pa.
Austin West.....Grand Junction, Col.
C. B. Brooksbank.....Richwood, W. Va.
A. E. Fields.....Lebanon, Ind.
William Young.....Carlinville, Ill.
Michael E. Seitz.....Cleveland, Ohio
J. L. Shade.....Philadelphia, Pa.

THE ELECTRIC SYSTEM

E. W. Wellington.....Joliet, Ill.
George F. Uchtman.....Sparta, Ill.
George Kraus.....Mogollon, N. M.
J. E. Dockter.....Farlington, Kan.
E. J. Becker.....Cleveland, Ohio
J. D. McGuire.....Loomis, Neb.
L. Ammeing.....Rochester, N. Y.
J. M. Swartley.....Cleveland, Ohio
H. A. Halsey.....Camp Meade, Md.
A. L. Burk.....Detroit

ENGINES

Robert L. Rainey.....Ashland, Mont.
E. Sanchez Marti.....Havana, Cuba
Theodore Stanke.....Winona, Minn.
Robert Neely.....Apache, Ariz.
J. M. King.....Griggsville, Ill.
Charles Hetherington.....Bentleyville, Pa.
J. Edgar Finn.....Brooklyn, N. Y.

LUBRICATION

Roland S. St. Pierre.....Williamsport, Pa.
Will Westerman.....Douglas, Wis.

CARBURETION

A. W. Hays.....Henderson, Cal.
Thomas J. Butler.....Pleasant Plains, Ill.
George F. Uchtmann.....Sparta, Ill.
B. L. Childs.....Middletown, Ohio
Dale L. Fritcher.....Nashua, Iowa
J. D. McGuire.....Loomis, Neb.

REBUILDING

R. F. McCain.....Lincoln, Neb.
F. C. Vanderheyden.....Lanark, Ill.
R. R. Crawford.....New Haven, Conn.
Ben Burton.....Chicago
Harold King.....Hope, Ark.

No communication without the writer's name and address will be answered in these columns.

3—It is claimed power valve grinding produces a better job than does hand grinding, if the man doing the work knows how to handle the power machine. Also, the work is done more rapidly.

4—Yes. Gasoline nowadays is made up of a group of hydrocarbons, each of greater and greater boiling points, that is, the first hydrocarbon may come off at a boiling point of about 70 deg. and the other compounds at higher and higher temperatures, so that at the end the remaining hydrocarbons may have a boiling point of 300 deg. From this it can be seen that when the engine is cold there will be certain of the hydrocarbons that cannot vaporize, and it is these that collect and run by the piston and so destroy the value of the lubricating oil.

Lozier Drive Gear Noisy

Q—There is a humming noise in the rear axle of my model 84 Lozier and it has considerable play in it. Would this play in the pinion shaft account for the noise?

2—Instruct how to eliminate play in the steering gear and show cross-section.—Michael E. Seitz, Cleveland, Ohio.

1—This play in the pinion shaft is probably the cause of the noise. To eliminate this it is necessary to remove the rear housing of the differential and turn to the left slightly, the adjusting nut on the toothed side of the ring gear. Then turn to the right the adjusting nut next to the back face of the ring gear. This will move the ring gear into the pinion. To adjust the pinion, remove the housing over the torque tube. It is not necessary to remove this housing completely but loosen the bolts and slide the housing back out of the way. This will expose the pinion adjusting nut, Fig. 1. The engaging faces of the gears should be so the backs of the gears just line up, the play almost eliminated and so when turned over by hand and no great strain is on the gears a cigaret paper can go between the teeth without being cut.

2—The steering gear mechanism is shown in Fig. 2. To adjust take up the wear in the drag link turning to the right the drag link adjusting nut. If this does not take up enough of the play, the worm gear adjusting nut can be turned down until the wheel moves not more than 2 in.

Removing Oldsmobile Clutch

Q—Publish directions for removing cone clutch from 1916 Oldsmobile.—J. L. Shade, Philadelphia, Pa.

To remove the clutch from the Oldsmobile remove the bolts that hold the short neutral countershaft in place. The removal of this countershaft will expose the castellated nut on the end of the clutch spring thrust bolt. Remove the clutch throw-out yoke from the collar bearing, and then

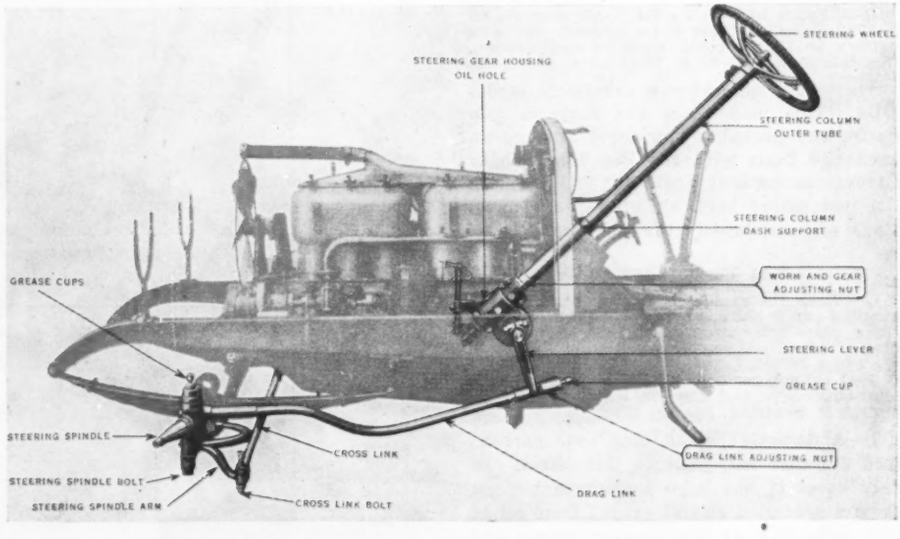


Fig. 2—Steering gear mechanism on Lozier, with its adjustments

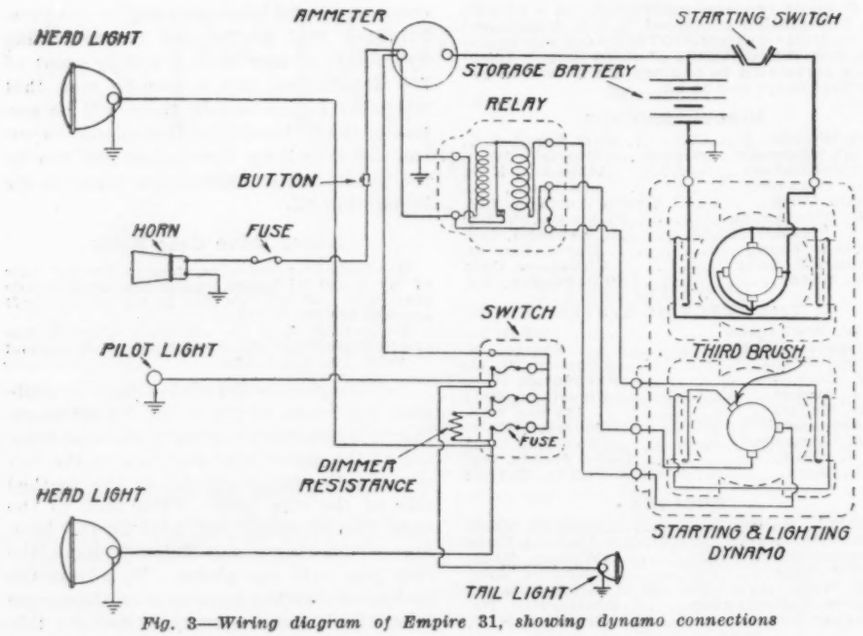


Fig. 3—Wiring diagram of Empire 31, showing dynamo connections

loosen gradually the nut on the end of the thrust bolt. If when the nut is almost off it is felt that the tension from the spring is still considerable, loosen the bolts that hold the cone to the clutch housing.

Do this gradually and so that all the bolts will be loosened the same amount. This will help to relieve the tension on the spring. When these bolts are almost removed it will be safe to take off the nut from the thrust bolt. Care must be exercised, for it is possible that a slight amount of tension will be left, and when the nut is removed the bolt will fly inward and is likely to cause damage. Next remove the thrust bolt plate and then remove the bolts from the clutch cone sleeve and slide the sleeve off. This will uncover the clutch spring retaining cap, which can be unscrewed and the spring then pulled out. The cone can be now pulled off the cone bushing.

The Electric System

Magneto on Buick

Q—I desire to install a D4 Bosch magneto on a 1917 Buick and use a transformer coil and battery so that I could start on compression. Can this be done?—E. W. Wellington, Joliet, Ill.

We would suggest you substitute model DU4. This model has the features you desire and probably you could arrange an exchange basis with the Bosch branch in Chicago so the cost would not be excessive. An instruction book showing the connections will accompany the new instrument.

Reo Fires When Off

Q—When the engine on a 1916 Reo has been running and is hot one cylinder continues to fire for a while after switch is turned off for stopping and finally is backfires and stops. What is the cause of this?

2—I cannot get over 35 m.p.h. What is the sped obtainable, and why can I not get more?—George F. Uchtman, Sparta, Ill.

1—A defective spark plug or a carbonized cylinder will produce this effect. In rare cases it has been known to happen from a grounded circuit caused from oil or dirt collecting at the breaker points and thus affording a path for the current even when the ignition current was turned off. However, we believe in your case a spark plug with a sharp electrode that becomes red hot and thus pre-ignites the mixture, is the trouble. If not this, then a carbonized cylinder is causing the trouble.

2—A general depreciated condition of the car will cause this slowing down in speed. The spark plugs may be dirty, the carbureter setting not right, the valves in need of grinding, the piston rings may be leaking oil and compression and the contacts of the igniter may be worn so that best results are not being obtained. With all these things in good running condition you should get about 55 m.p.h. out of the car.

Battery Gases

Q—What size cable should be installed from generator to battery?

2—I have just had the battery on my 1916 Dodge Brothers car overhauled, having had new separators put in. The battery foams when on charger. I have a Westinghouse rectifier with 5-amp. flow. The battery takes full charge, and the foaming does not interfere with the battery. What causes this, and how can it be eliminated?—George Kraus, Mogollon, N. M.

1—Use wire of 00 or 000 B. & S. gage, or stranded conductors of over 120,000 circular mill area.

2—Several things might be wrong with the battery. The acid is probably too heavy, that is, the specific gravity is too high. The insulator may not have been soaked long enough before installing in the battery, which would prevent the proper chemical action.

Magnets on Ford

Q—Do you consider that the Ford flywheel magnets lose their magnetism in a reasonable length of time, say three to five years, when no dry cells have been used on the car and other conditions have been normal?

2—I am told by a great many that it was necessary to have new magnets and coils installed, that when tested by repairmen using magneto testers it showed a very poor current. Are magneto testers reliable?

3—Are they of special benefit to repairmen? Would you advise a repairman catering to Ford repairing to procure one?

4—I have noticed two different types of gearless differentials, the Bailey and the Dorr-Miller advertised for Fords. Is either one successful? Will they wear out quickly? Would you advise their use?

5—Is there any carbureter made which will tend to give better satisfaction on a Ford engine than the regular equipment?

6—If so, will the Sunderman for Fords be a good investment for the car owner?—J. E. Dockter, Farlington, Kan.

1—Yes.

2—Usually.

3—Yes.

4—They both have the advantage of putting power on the wheel that has traction.

5—Yes, but they cost more.

6—Probably.

Relay Burns Out

Q—The relay on a 1915 Empire burns out. It has been repaired and several new relays put in. Every man who worked on it seemed to have a different theory as to the cause. I am advised that the relay should be wound with wire that could not be injured by overheating. Could this be done?—E. J. Becker, Cleveland, Ohio.

It is not advisable to rewind the relay with any special resistance wire, as this would tend to heat the relay and cause expansion of the contact arms and thus cause a variation in the setting. We believe the third brush in the dynamo, Fig. 3, is the cause of the trouble. Change the setting of this brush and watch the spark at the contact points while the engine is running around the generator cut-in speed. If the spark cannot be eliminated by this, then shunt a condenser around the terminals of

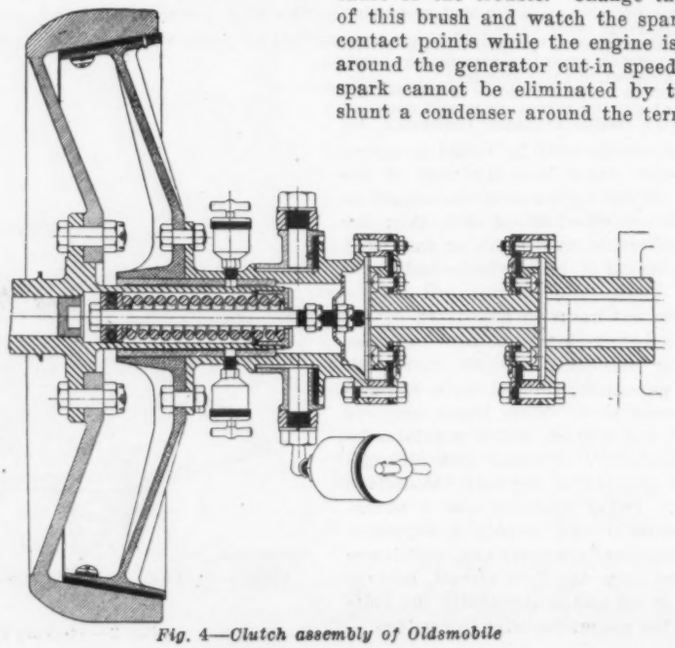


Fig. 4—Clutch assembly of Oldsmobile

the contact. This will absorb the energy of the spark at the time of contact making and breaking and thus will solve the problem.

Car Hard to Start

Q—I have a Kingston low-tension magneto with Bosch dual coil and switch on a Chalmers model M used for truck purposes and have burned out two coils previous to this one.
2—I also have a great deal of trouble starting the engine.—J. D. McGuire, Loomis, Neb.

1—This model Chalmers had four coils operated from a commutator on the magneto shaft. The coil contacts may be worn so soft fusible metal makes the connection instead of the platinum points. If this is the case, the contacts stick intermittently and cause the coil to burn out.

2—The commutator may be pitted or dirty, the contacts on the coils may be causing the trouble, the storage battery with which the car was equipped may be low in voltage. Go over these and see that they are in good condition. It might pay to install a one-coil battery system of any modern make, using a distributer and breaker points, operated from the same shaft that now operates the commutator.

Packard Lights Burn Out

Q—Publish wiring diagram of 1914 Packard limousine.
2—What causes generator to burn out lights when running at a car speed of 30 m.p.h.?—L. Ammeing, Rochester, N. Y.

1—This is shown in Fig. 7.

2—It is evident the regulator does not regulate. This regulator is of the vibrating type that inserts intermittently into the field circuit a resistance which cuts down the field current when the voltage is high and increases the field current when the voltage is low. In your case it seems the regulator contact cuts off the battery from the generator circuit at low speeds, as it should, but at high speeds, instead of the vibrator vibrating, it merely makes a permanent contact, with the field resistance out of the circuit. The remedy is to have the contact points smoothed or, if worn or burnt out, renewed. Then have the spring examined and adjusted to suit the new contact conditions. This work is for a skilled man only.

Connections on Lexington

Q—Give instructions to install a set of dry cells for ignition purposes as an auxiliary to the Willard storage battery on Lexington Minute-Man six.
2—Publish wiring diagram of the 1917 Lexington six.
3—How do you use an 110-volt house current for battery charging?
4—With a lamp bank, how many lamps?
5—With a transformer, how long does it take to charge the battery?
6—Publish diagram of the generator used.—H. A. Halsey, Camp Meade, Md.

1—Referring to the diagram of the Lexington, the black wire is the one which supplys the low-tension current to the coil. It will be necessary to cut this wire and install a three-point switch, as shown. Connect the positive, or zinc, side of the battery to the ground. Four dry cells will give the required voltage, but the capacity will be low, so use eight cells, connecting them up in two sets of four.

2—See Fig. 5.

3—If you have A. C. current, use a rectifier of some sort.

4—Charge at a rate of about 8 amp., or sixteen 50-watt lamps.

5—The time element is dependent on the batteries' condition. It is a cheap investment to secure a hydrometer and test the electrolyte at intervals. As soon as the specific gravity reaches 1.280 or better, the battery is charged.

6—The internal circuit of this Westinghouse generator is shown in Fig. 6.

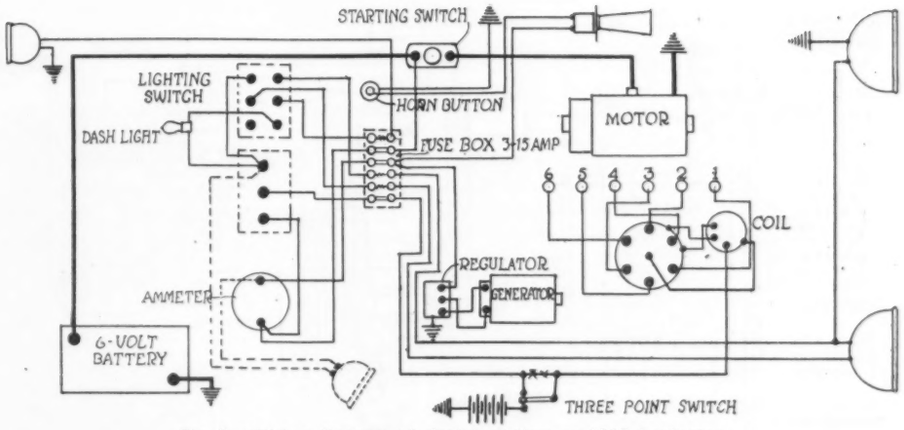


Fig. 5—Wiring diagram of electric system on 1917 Lexington

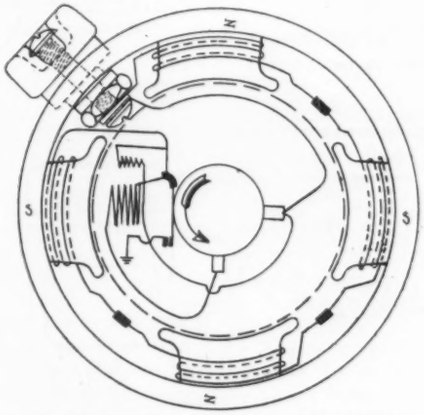


Fig. 6—Internal circuit of Westinghouse generator

Testing Ignition Coil

Q—How do you test the ignition coil to find whether it is in good condition, this not being in circuit or mounted on car? The coil has been in use on Buick B37 on storage battery side of switch.—J. M. Swartley, Cleveland, Ohio.

Use the storage battery of the car and connect it to the low-tension side of the coil. Leave one of the terminals free so an intermittent contact can be made. Then make and break the circuit and watch the safety spark gap. If a spark occurs here, the coil is in good condition. If no spark occurs, attach two short wires to the high-tension terminals and bend so they almost touch, leaving a gap of about ⅛ in. If no spark occurs between these two points when the circuit is closed and opened, examine the terminals and their connections. These must be tight. If no trouble is found here and the coil refuses to spark, probably it is burnt out. The cheapest remedy is a new coil, it costing quite a bit more to have the old one taken apart and repaired.

Wiring of Oakland 48

Q—Publish wiring diagram of the Oakland 6-48 touring car, with the Delco mercury-type regulator.
2—Explain the action of the starting motor when the foot pedal is pushed in.—A. L. Burk, Highland Park, Mich.

1—This is shown in Fig. 8.

2—First the ignition button is pulled out. This causes the armature of the generator to revolve slowly, using the battery current in the generator winding of the armature. The brushes of the generator never lift from the commutator surface, so this is accomplished without the aid of any brush

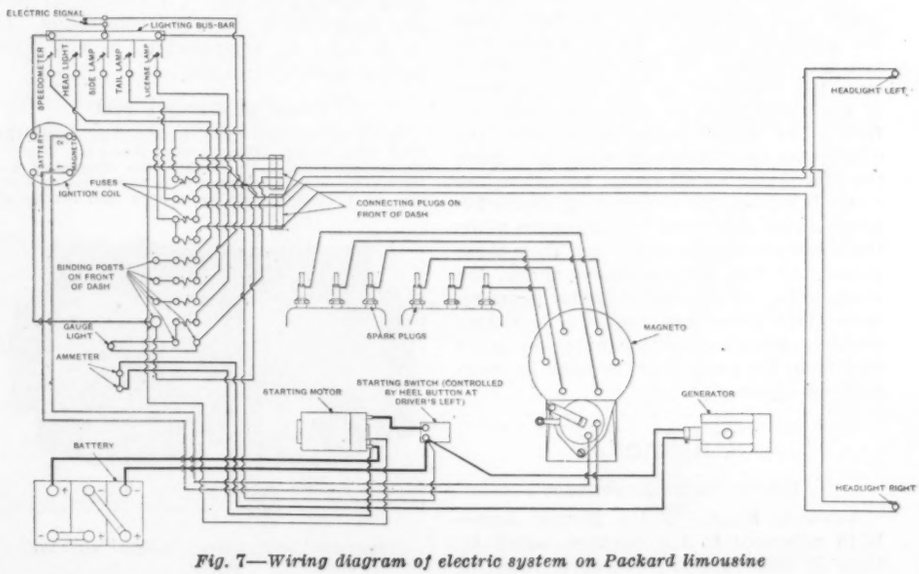


Fig. 7—Wiring diagram of electric system on Packard limousine

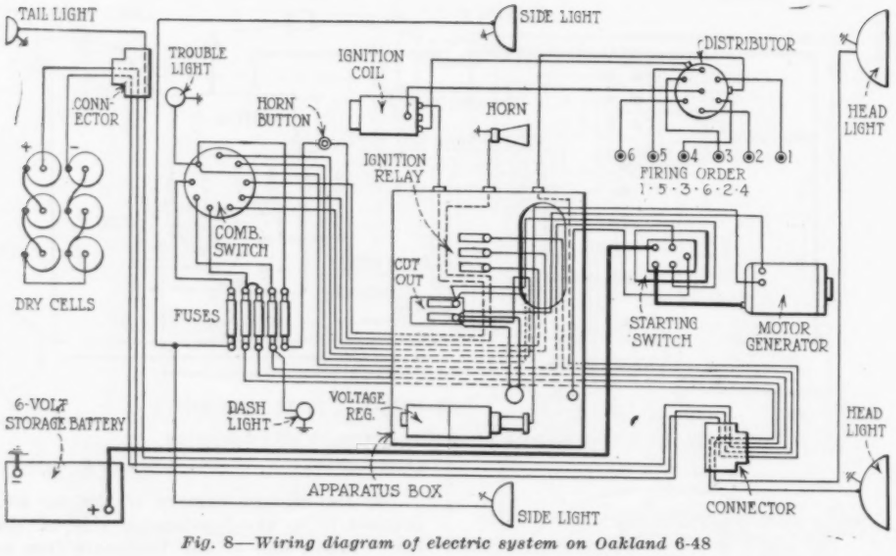


Fig. 8—Wiring diagram of electric system on Oakland 6-48

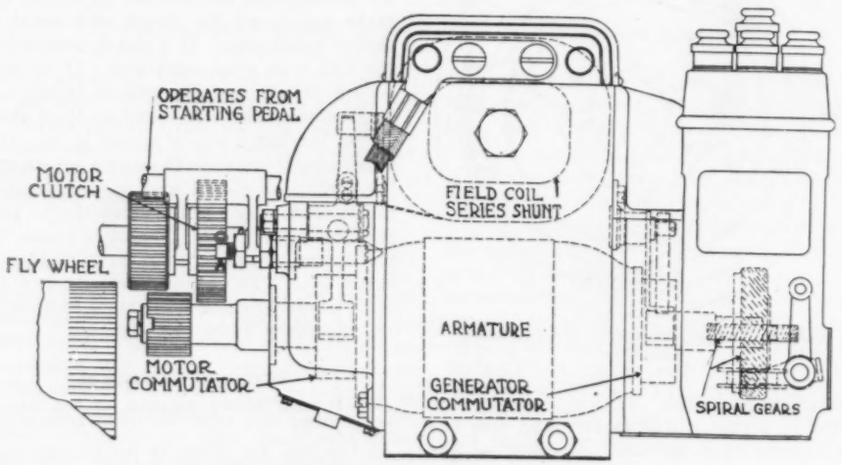


Fig. 9—To show operation of mechanism when starting pedal is pressed

lifting. Then after the armature is revolving the starter pedal is pressed. This motion moves the two gears, shown in Fig. 9, to the left. The smaller one engages with the flywheel and the larger one with the starter pinion. The first movement of the starter switch brings these gears into mesh.

The second motion of the starter pedal, which is a continuation of the first, opens the generator circuit. As the starter button is depressed all the way, the motor circuit is completed by the dropping down of the motor brush on the commutator surface. The spiral gears which drive the distributer are always in mesh and drive the distributer at all times, but when the motor is started the overrunning clutch between these gears and the armature allow the armature to disconnect itself from these gears. As soon as the engine starts, the overrunning clutch on the starter gears release these gears and they fly back into position, allowing the generator to catch hold from the pump shaft through its overrunning clutch.

Engines

Reader Offers Experience

Ashland, Mont., Editor MOTOR AGE—With reference to the question asked by Matt R. Donovan, Jr., Bearnard, Iowa, in the Feb. 27 issue, will say that I had to work on a Willys-Knight car that was hard to start. I could start car only by pulling with another car. I put in a new set of patented piston rings. Now the car starts all right. If the car in question throws off an excessive amount of smoke when running, it is a good sign it is leaking oil past the rings and is light on compression. If it is light on compression, it will start hard.—Robert L. Rainey.

Power of Duray's Fiat

Q—I would like some information about the Fiat with which Arthur Duray broke the world's record at Ostend in 1913. One source of information states the engine is the greatest ever put on a chassis, having a bore and stroke of 7.48 by 9.84 in. Others state it was 7.48 by 10.4 and that there was a still larger old Fiat engine having 9.4 by 12.6 and a Benz of 7.87 by 9.8 in. Which of these statements is true?

2—Do you know the exact address of the Commercial Cars, Ltd., of England?—E. Sanchez Marti, Havana, Cuba.

1—Duray's Fiat had an engine whose bore and stroke was 7.48 by 10.4 in. This is the one which was used at Ostend. Its horsepower was 300.

The Nazarro Fiat measured 9.4 by 12.6 in. and developed 350 hp. This car appeared at Brooklands but was not run. The car was too large and did not really do fast work. The engine later was used on a boat.

The Benz car which Burman drove had an engine that measured 7.87 by 9.8 in.

2—No.

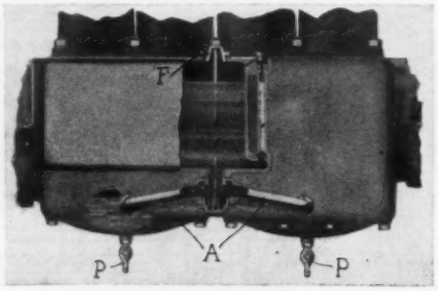


Fig. 10—Lubricating system on the E.M.F.

Pistons for Chevrolet

Q—What is the horsepower of a 1916 Chevrolet 490?

2—What number of revolutions does this engine turn idle and under load?

3—Where can I get aluminum pistons and connecting rods for this car, and would it increase the speed to a very great extent?—Theodore Stanke, Winona, Minn.

1—The maximum horsepower of this engine is about 30 at 2000 r.p.m. The S. A. E. rating is 21 horsepower.

2—The maximum is about 2000 r.p.m.; idle speed depends on condition of engine. When in good condition it should slow down to an even speed, with each explosion perceptible and distinct from the rest. This is under 100 r.p.m.

3—See advertising columns of MOTOR AGE.

Continental Engine Speeds

Q—Is the Bimel Automobile Co., Sidney, Ohio, in business yet?

2—What is the maximum speed of the standard 3¼ by 4½ six-cylinder Continental engine in general use this season, and of the 3¼ by 5½ used previously?—Robert Neely, Apache, Ariz.

1—The N. A. C. C. does not list the Bimel company as active.

2—The Continental engine model 7-W develops about 42.5 hp. at 2160 r.p.m. and the larger and older model about 50 hp. at 1900 r.p.m.

Governor on Ford

Q—Where can I obtain a governor for a Ford engine, throttle type?

2—At what speed should a Ford engine run, used with truck attachment?—J. M. King, Griggsville, Ill.

1—From the following manufacturers: Pierce Governor Co., Anderson, Ind.; Monarch Governor Co., Detroit.

2—This cannot be said exactly, because the gear ratio of the truck attachment is not the same in all cases, but the average speed varies from about 1400 to 1800 r.p.m. at a speed of 20 m.p.h.

Heald Cylinder Grinder

Q—Publish cross-section of the Amplex two-cycle engine.

2—Publish any data you may have concerning this engine such as bore and stroke, diameter ports, number degrees of opening before bottom center, etc.

3—Publish cross-section of two-cycle 100-h.p. aircraft engine manufactured by the Roberts Mfg. Co., Sandusky, Ohio.

4—Concerning the use of the Heald cylinder grinder for grinding the cylinder bore smoth, illustrate and explain the best way of lining up the bores with the grinding wheel, getting the bore at right angles to the path of the grinding wheel so the finished bore will be straight, etc.—J. Edgar Finn, Brooklyn, N. Y.

1—A fore and aft cross-section of the engine is shown in Fig. 13.

2—The bore and stroke of the Amplex two-cycle engine is 4.13 in. by 5.25 in. We

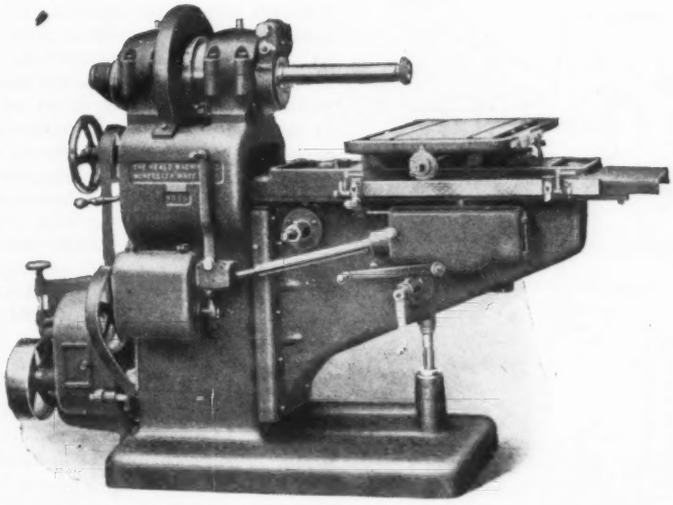


Fig. 11—Heald cylinder grinder

do not know the port openings and their relative timing as compared to the piston position. One of the big differences, outside of the fact that the engine was two-cycle, is the crankshaft construction. The throws of the crank are set at 90 deg.

3—We cannot furnish this illustration.

4—It must be remember that the Heald grinder is not made for garage and service station work where there are many different kinds of engines to be ground, for with each block of different pattern there is required a jig. The whole operation with the grinder depends upon the accuracy of the jig, and when once this is made, the block is placed in the jig, clamped down and ground out. The grinder and jig is illustrated in Figs. 11 and 12.

Timing Haynes

Q—Give instructions for timing 1916 Haynes 36.

2—Give instructions for adjusting Rayfield carbureter used on this model.—Charles Hetherington, Bentleyville, Pa.

1—The Haynes valve timing is as follows: Intake opens 5 deg. after top center and closes 28.5 deg. after bottom center. Exhaust opens 46 deg. before bottom center and closes 2 deg. after top center.

2—The Rayfield carbureter adjustment shown in the April 10 issue is the same for your Haynes.

Lubrication

Mixing Oil and Gasoline

Q—Can good results be obtained by mixing lubricating oil with gasoline?

2—If so, what percentages should be used?

3—What is the benefit? I have heard it gives more power and greater mileage per gallon.

4—Does having the top up make a very noticeable difference in the maximum speed, the fuel mileage and hillclimbing ability of a car, due to wind resistance?

5—Publish photograph of Pathfinder model 3B seven-passenger sporting roadster, chassis, rear view, with top up.

6—When did Pathfinder discontinue making cars and why?

7—What is the approximate brake horsepower of Pathfinder 3B?

8—What speed should it make under generally favorable conditions?

9—What date was the Pathfinder 3B, No. 17002, built?

10—Where can I get a catalog or literature on this car?—Roland S. St. Pierre, Williamsport, Pa.

1—It is a common practice with two-cycle engines. It is not necessary in modern four-cycle engines as the lubricating proposition, as a rule, has been worked out carefully in all cases of engine design. In

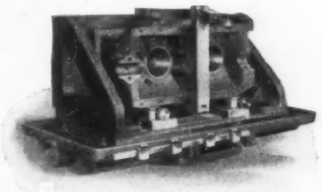


Fig. 12—Rear view of Heald grinder

the old types, where only the splash system was used and there was some uncertainty of the oil reaching all parts, this scheme was resorted to. And in long, fast, hard drives it will give some aid inasmuch as it surely carries oil into the cylinders and provides lubrication for the pistons. Two-cycle engines lubricate very well by this method.

2—A quart to 5 gal. of gasoline would be the maximum and this quantity to 10 gal. should be enough. This can be determined best by trials. You may be sure the quantity is about right when not more than a very slight trace of smoke comes from the exhaust when running.

3—It helps lubricate the pistons and cylinder walls, but it will not give greater mileage and power except it may prevent friction in the movement of the pistons. Remember, too much oil will tend to foul the plugs, increase the amount of carbon deposit on the piston head and in the combustion chamber, as well as permit an accumulation on the valves and valve seats. Likewise, some of it will find its way to the valve stems and valve guides and will gum these unless they are cleaned out occasionally with kerosene. There is danger of upsetting the carburetion, as gasoline of to-day is bad enough anyway.

4—Yes, decidedly, but just what will depend upon several things, chief of which is the speed of the car and the amount of resisting surface.

5—This is not available.

6—In 1917. There are always many inside reasons for such matters. It is probable the company found itself without sufficient working capital and none too good a market for such a high-priced car with so many others on the market.

7—We have no record of this.

8—Better than 60 m.p.h.; perhaps 70 m.p.h.

9—The 1917 Pathfinder cars were numbered from 8001 to 17,525, so this must have been one of the last of the 1917 cars.

10—Try the receiver for the company at Indianapolis. By addressing the company a letter doubtless will find the proper person. Perhaps the National Automobile Chamber of Commerce, 7 East Forty-second street, New York, can furnish you with a catalog.

E. M. F. Oiling System

Q—How many revolutions per minute does the E. M. F. engine develop?

2—How does the oiling system work on the 1911 E. M. F. with the tank on the side? For what purpose is the valve in the tank?

3—Does it hurt any to run an engine where the babbit has come loose when the connecting rod is kept tight?

4—How many revolutions per minute do the following engines develop: 1917 and 1918 models of Studebaker, Mitchell, Buick, Dodge and Ford?—Will Westerman, Douglas, Wis.

1—We are not able to supply in a great many cases the engine revolutions per minute. This knowledge does not benefit one very much except that it gives an idea of a fast- or slow-speed engine. The engines of that time were slow speed, 1600 to 1800 r.p.m. being about the maximum. The present tendency is to perfectly balance the engine and so reduce vibration to a point where the engine speed is materially increased. So that now we have engines which in general run about 2400 or more r.p.m. Of course, this information is valuable to the designer, for it is this figure that he builds his car around. He takes the speed of maximum torque exertion and accommodates this through suitable gear reductions and tire sizes, so that the average touring speed will utilize this most efficient speed of the engine.

2—Fif. 10 shows the oiling system of the E. M. F. The valve in the tank regulates the oil level in the engine as follows:

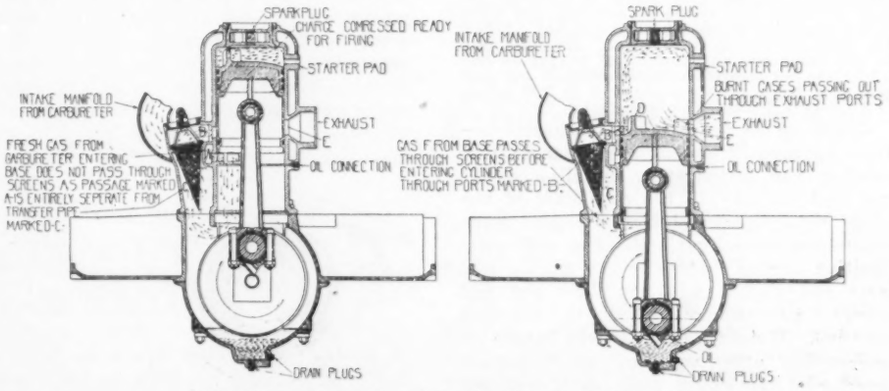


Fig. 13—Cross-section of the Amplex two-cycle engine

As the engine uses oil from the crankcase compartments sufficient to uncover the supply pipes, air will bubble back into the oil reservoir, thus relieving the vacuum and permitting more oil to flow into the crankcase. This flow continues only long enough to create a vacuum in the tank, which then holds the remainder of the oil. When the supply again is reduced in the engine air will flow back and relieve the vacuum. This is automatic and requires no attention.

3—If the rod is kept tight no harm will be done, but this cannot be done very long because the slight space between the loosened connection eventually will cause the babbitt to pound itself out of round.

4—See 1.

Carburetion

E. M. F. Oiling System

Q—I have a car and wish to know its name. It is made by the E.M.F. Co. I found the name on a plate on the engine side of dash. Under this there was the word Flanders and under that 20.

2—Give size of cylinders in bore and stroke.

3—How can I adjust the oil feed? It has an oil tank cast on the side of the crankcase.

4—Show cross-section of carbureter used on this car and method of adjustment.—A. W. Hays, Henderson, Cal.

1—This is one of the three cars made by Studebaker at one time. Its name is E. M. F. The other two were the Flanders and Studebaker.

2—4 by 4½ in.

3—The oil system of the E. M. F. is automatic and the oil level adjusts itself automatically. However, if the level is to be raised, it can be done cheapest by drilling a hole in the filler cap. This hole should not be larger than a mere pin hole, for then the vacuum will be destroyed and the oil consumption will be excessive. If it is found that a pin hole is too large, scrape the top of the filler cap and solder the hole up. Then make another one with a fine cambric needle.

4—A sectional view of the carbureter is shown in Fig. 15.

Carburetion May Be Trouble

Q—A 1918 Ford has run about 4000 miles and is equipped with a Wilmo manifold and a Stromberg carbureter. The engine starts easy and hits fine on all cylinders and will throttle down very slow on high without skipping, so I am having no trouble with ignition. The main trouble is when the engine gets heated up to where it should be it does not seem to have any pep and has a tendency to pound if the throttle is opened suddenly. In fact, the car runs fine till the Moto-Meter registers about 100 deg. The water does not boil on ordinary running. The carbon has been scraped but there was very little, the pistons seem tight and no oil seems to get by as I never have had to clean a plug. I carry the oil level so it always runs out the top petcock. The compression is good on all four cylinders and valves do not leak and have 0.015 clearance when the engine is hot. When the engine is hot it cracks hard. Gasoline gets in the crankcase and instead of having to put oil in the crankcase I have to drain it out and put in a fresh supply every 200 or 300 miles. —Thomas J. Butler, Pleasant Plains, Ill.

Check up on ignition and carburetion—it is apparently one or the other that is causing the disturbance. Gasoline would not find its way to the crankcase if the rings were tight and if the engine were burning practically all the fuel. If your ignition is late, naturally the engine will heat and also it will not show pep and power, particularly when it becomes warmed. When it is cold it will handle an excess but after warming up it cannot handle it. It would seem as if you are feeding more fuel to make up for the lack of power that would come with an advanced spark. This trouble should be remedied, for to continue using the car when gasoline will keep the oil level up means scored cylinders and probably burned-out bearings when least expecting it. Keep the spark advanced as much as possible as long as you do not hear an ignition knock and then try cutting down on the low-speed adjustment and giving more air on the high. It would be well to begin the carbureter adjustment from the start, as if it had never been made, otherwise you may not have the proper relation between the two adjustments.

It naturally would follow that when an engine becomes hot—and perhaps is lacking in lubrication through the oil being thinned by the gasoline—it will turn over somewhat hard.

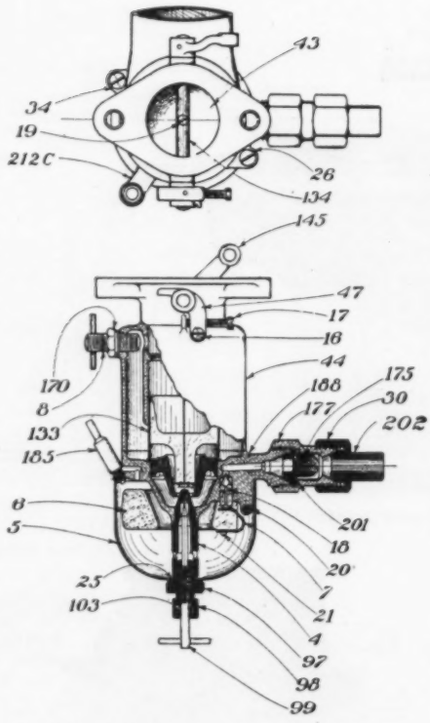


Fig. 14—Johnson carbureter used on Reo

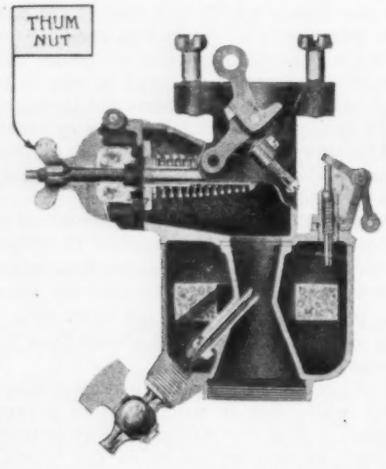


Fig. 15—Carbureter used on the E.M.F. 30

Johnson Carbureter on Reo

Q—Publish diagram and directions for adjusting Johnson carbureter on a 1916 Reo.—George F. Uchtmann, Sparta, Ill.

The Johnson carbureter is shown in Fig. 14. To adjust, the engine must be at running temperature, the spark fully retarded and the steering column control on the position "run." Do not attempt to make the adjustment by changing slightly from the previous one, but screw needle valve 99 lightly to its seat and also turn in slow speed crew 8 until it is entirely closed, leaving the carbureter completely shut off. Then turn needle valve 99 to the left one and a half turns and start the engine. Next open the throttle quickly, and if the engine does not miss or backfire, turn adjusting needle 99 to the right a little at a time until the engine does backfire while accelerating. Then turn the needle about one-sixteenth turn to the left. This gives the intermediate and high-speed adjustment and the most economic setting. By screwing out the lever stop screw 17 the speed of the engine can be brought down to as low a speed as desirable.

Maybe This'll Help You

Middletown, Ohio, Editor MOTOR AGE—Feb. 27 a man asks for information regarding the heating of a Chandler manifold. I have a 1917 model and have experienced difficulty in getting the engine to run smooth.

My car was completely overhauled last fall and cylinder reground and aluminite pistons installed. The car ran beautifully all but at first. They advised putting on a carbureter using all hot air, also wrapping my intake with copper tubing through which the hot water would circulate. I did neither but took two pieces of roofing tire. Each of these pieces was long enough to cover the exhaust pipe and intake manifold on each side of carbureter. I shaped

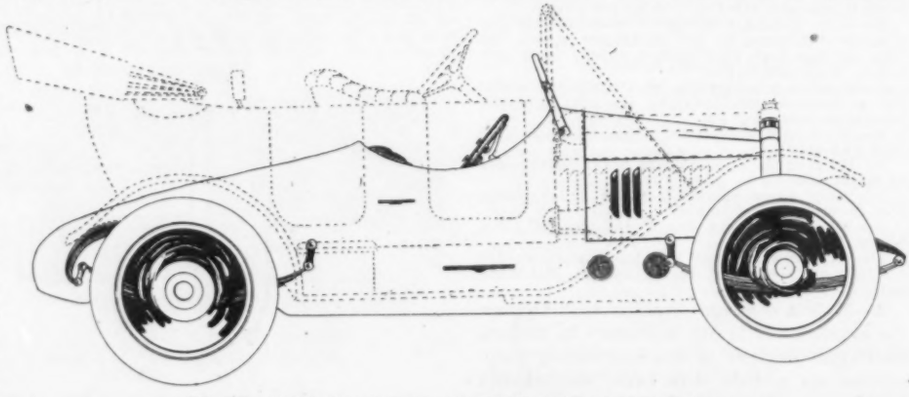


Fig. 16—Suggestion for changing White into a two-passenger

these as snugly as possible to fit the places and put a wire around each piece and twisted it tight to hold in position. I then made a collar elbow out of tire to fit the air intake on the Rayfield carbureter and put one end of a piece of flexible tubing into the collar and ran the other end into the tin around the exhaust pipe for the heated air. The car now acts like a car should, warms easy and runs on a leaner mixture. So far I have seen no bad results. I also shut off the hot water around the carbureter as that was a hoax, as it took the water after it had passed through the radiator and tried to warm the carbureter with it. Be sure and bend the tire around the manifold in front as the cold air coming off the fan cools the front end of intake manifold and causes loading in front cylinder.—B. L. Childs.

Float Valve Not Seating

Q—What causes the gasoline to seep out around the top of the bowl on a Ford carbureter, a Kingston? I baked and varnished the float without results. The float level does not seem to be too high and it never leaks fast enough to run out of the bowl vent or to even drip, but just keeps the bowl wet all the time. It is not condensation, because you can take it to pieces and clean it and when you turn the gasoline on again it would seep over the top and down the side of the bowl. I stopped it by fitting a paper gasket around the top of the bowl, but what is the cause?—Dale L. Fritcher, Nashua, Iowa.

It is evident the float valve is not seating, or else the gasoline would cease flowing at some point. You do not state what model of Kingston carbureter is used nor give the year the car was made. There are two models of the Kingston and they are different, but inasmuch as the trouble is in the float valve it will make little difference. You might try regrinding the pin to make it lodge perfectly in the seat, but it is a delicate job and calls for a fine abrasive, something as fine as pumice. It will be far better to install a new valve and seat. Putting a gasket under the cover will do no good, for the bowl will fill and you will have too rich a mixture.

Carbureter Too Old

Q—What is the best carbureter to install on a Chalmers model M used for truck purposes? I have a model R Schebler carbureter on now. It does not give proper satisfaction and am told it is not right for so heavy an engine.—J. D. McGuire, Loomis, Neb.

The model M Chalmers is a 1911 product, and there is wonder the carbureter works at all, considering it was designed for high-gravity fuel and the present gasoline measures about 48. It is our opinion that an efficient air-heating stove will improve the carbureter operation. Conduct a portion of the exhaust gases through a bypass and allow these to heat the intake air. If you want to install a new carbureter, cut down on the length of the intake manifold passage as much as possible. This will prevent condensation.

Rebuilding

Lowering Frame On White

Q—Publish illustration of a White 6-60 seven-passenger converted into a two-passenger touring racer, low hung.

2—The present springs are the semi-elliptic and overslung. What changes would be necessary in spring suspension and frame construction in remodeling into a low-hung car?—R. F. McCain, Lincoln, Nebr.

1—This is shown in Fig. 16.

2—There is a limit to which you can go in dropping the frame of a car of this type, which is over the axles. If it were short enough to drop between the axles, there would be no such limit. You must make allowance for spring action so the frame will not strike the rear axle. How much clearance you have can be told by an examination. Probably you can sling the main rear spring under the axle, thus letting it down some 3 in., but it is not likely this can be bettered to meet your desires. This would not involve much trouble or expense inasmuch as probably you can invert the spring seat, putting the seat and spring under the axle. This would not call for a change in the quarter spring. Otherwise you could make a frame extension and bolt it to the frame so as to give a frame effect like a Hudson, doing away with the quarter spring and having a long rather flat main spring.

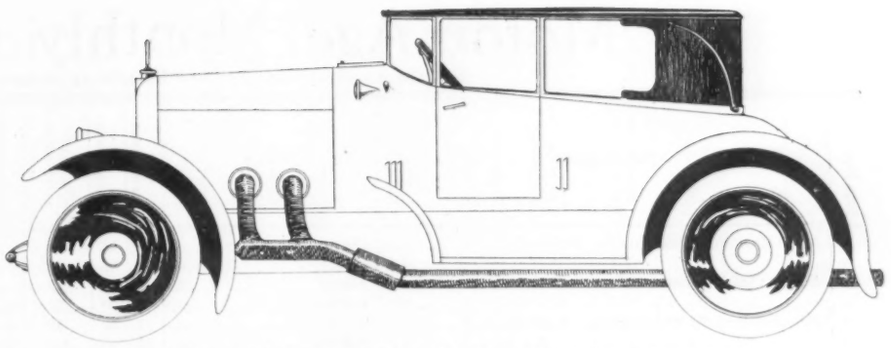


Fig. 17—Suggestion for making closed sporting body on Marmon 34

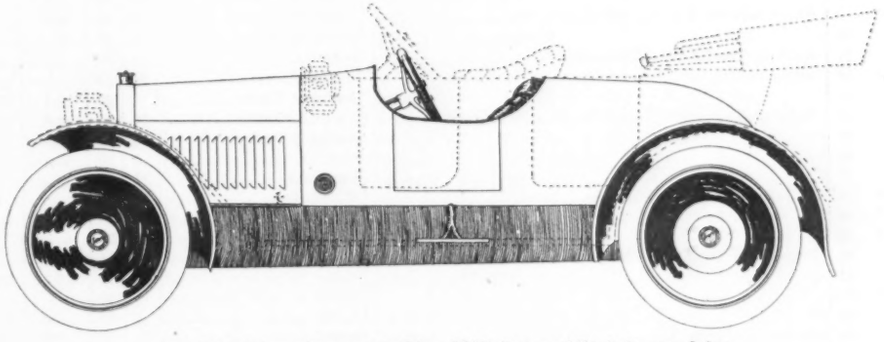


Fig. 18—Suggestion for making 1912 Locomobile into speedster

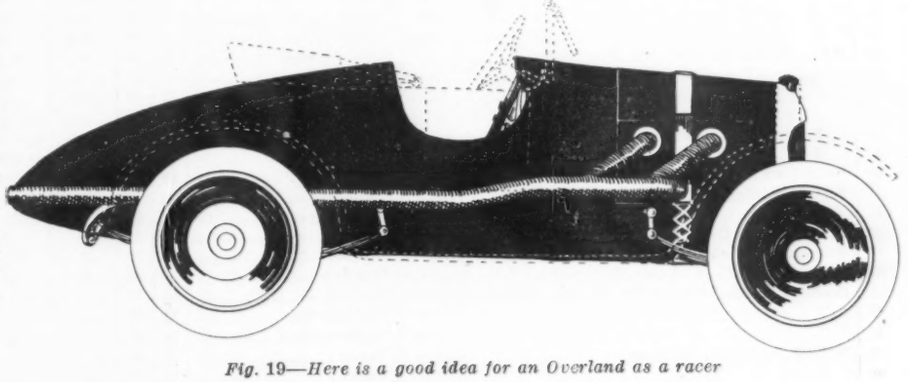


Fig. 19—Here is a good idea for an Overland as a racer

Abbott Body on Cadillac

Q—Can a four-passenger Chummy Abbott body be put on a 1913 Cadillac chassis?

2—What kind of a carbureter should be put on this engine to burn standard gasoline?—F. C. Vanderheyden, Lanark, Ill.

1—The change is not impossible, but it will call for a new bonnet and radiator to be in keeping with the later body. It is certain the chassis must be completely stripped and the new body built on by constructing new sills fitted to the body and to the chassis.

2—Use any well-known carbureter of an up-to-date design. It will be advisable to fit the engine with a shorter intake manifold and an efficient air stove over the exhaust manifold.

Rebuilt Locomobile

Q—Publish suggestion for rebuilding a 1912 Locomobile into a snappy speedster, something on the order of the 1912 Stutz open-front.—Ben Burton, Chicago.

See Fig. 18.

Closed Sport Marmon

Q—Publish a sketch of a closed sporting body for a Marmon 34 chassis.—R. R. Crawford, New Haven, Conn.

See Fig. 17.

Wants Overland Racer

Q—Publish suggestion for cutting down Overland 75 into a racer with streamline body. Could a body as you mention be purchased? If so, from whom?—Harold King, Hope, Ark.

See Fig. 19.

The C. P. Kimball & Co., 3900 South Michigan avenue, Chicago; Irwin Robbins & Co., Mission and Division streets, Indianapolis, Ind.; Schutte Body Co., 111 East King street, Lancaster, Pa.

Motor Age Monthly Guide to Tractors

These tables are revised and brought up to date monthly

Line No.	Manufacturer	Tractor	Drawbar horsepower	Belt horsepower	No. plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	Cylinders
1	Acme Harvesting Machine Co., Peoria, Ill.	Acme	12	25	3	.....	2600	6000	$1,800	2 Wh.	54	Beav.	4 Ver.
2		Acme	12	25	3	.....	2600	6800	2,250	2 Cr.	.....	Beav.	4 Ver.
3	Adams Co., Maryville, Ohio	Adams	9	13	1-2	.....	.....	5500	850	2 Wh.	36	Herc.	1 Hor.
4		Oil Pull	12	20	3	22 x 36	2150	.....	.....	2 Wh.	51	Own	2 Hor.
5	Advance-Rumely Thresher Co., Laporte, Ind.	Oil Pull	16	30	4	28 x 44	2850	.....	.....	2 Wh.	56	Own	2 Hor.
6		Oil Pull	20	40	5-6	32 x 52	3750	.....	.....	2 Wh.	64	Own	2 Hor.
7		Oil Pull	30	60	8-10	36 x 60	5900	.....	.....	2 Wh.	80	Own	2 Hor.
8		Allis-Chalmers	18	30	3-4	.....	3000	5300	.....	2 Wh.	50	Own	4 Ver.
9	Allis-Chalmers Mfg. Co., Milwaukee, Wis.	Allis-Chalmers	10	18	2-3	.....	1650	4800	.....	2 Wh.	56	Own	2 Opp.
10		Allis-Chalmers	6	12	1	.....	1000	1850	.....	2 Wh.	48	Le Roi	4 Ver.
11	Andrews Tractor Co., Minneapolis, Minn.	Andrews	12	20	.....	.....	1900	5250	1,000	2 Wh.	48	Veer.	4 Opp.
12	Appleton Mfg. Co., Batavia, Ill.	Appleton	12	20	.....	24	2200	4900	1,800	2 Wh.	54	Buda	4 Ver.
13		Aultman-Taylor	15	30	3-4	22 x 36	3300	7800	.....	2 Wh.	70	Wauk.	4 Ver.
14	Aultman-Taylor Machinery Co., Mansfield, Ohio.	Aultman-Taylor	22	45	4-6	32 x 50	4700	12800	.....	2 Wh.	70	Own	4 Opp.
15		Aultman-Taylor	30	60	8-12	42 x 64	8000	23000	.....	2 Wh.	90	Own	4 Opp.
16		Multipedal	5	10	.....	.....	750	950	.....	2W or 2C	.....	Le Roi	4 Ver.
17		Multipedal	12	20	.....	.....	2000	3500	.....	2 Cr.	.....	Buff.	4 Ver.
18	F. C. Austin Co., Inc., Chicago,	Multipedal	15	30	.....	.....	2400	4500	.....	2W or 2C	.....	Buff.	4 Ver.
19		Multipedal	20	40	4	.....	3200	10250	.....	2 Cr.	.....	Auto.	4 Ver.
20		Multipedal	25	50	.....	.....	4200	12500	.....	2 Cr.	.....	Buff.	4 Ver.
21	Automotive Corp., Fort Wayne, Ind.	Automotive	12	24	2	30	1500	3200	1,450	.....	42	Herc.	4 Ver.
22		Avery	5	10	2	Small	.....	2600	.....	2 Wh.	30	Own	4 Ver.
23		Avery	5	10	.....	.....	.....	3050	.....	2 Wh.	42	Own	4 Ver.
24		Avery	8	16	2-3	20 x 30	.....	4900	.....	2 Wh.	50	Own	2 Hor.
25	Avery Co., Peoria, Ill.	Avery	12	25	3-4	24 x 36	.....	7500	.....	2 Wh.	56	Own	2 Hor.
26		Avery	14	28	3-4	.....	.....	6800	.....	2 Wh.	60	Own	4 Hor.
27		Avery	18	36	4-5	28 x 46	.....	9250	.....	2 Wh.	65	Own	4 Hor.
28		Avery	25	50	5-6	32 x 54	.....	12500	.....	2 Wh.	69	Own	4 Hor.
29		Avery	40	80	8-10	36 x 60	.....	22000	.....	2 Wh.	87½	Own	4 Hor.
30	Bates Tractor Co., Lansing, Mich.	Bates All Steel	15	25	3	24	3000	4000	.....	W.&C.	50	Own	4 Ver.
31	Bean Spray Pump Co., San Jose, Cal.	Track Pull	6	10	2	.....	1125	3200	1,340	1 Cr.	.....	Le Roi	4 Ver.
32	Beltrail Tractor Co., St. Paul, Minn.	Beltrail	12	20	2-3	.....	2000	4500	.....	1 Cr.	.....	Wauk.	4 Ver.
33		Best Tracklayer	12	25	.....	22 x 36	2100	5200	2,450	2 Cr.	.....	Own	4 Ver.
34	C. L. Best Gas Tractor Co., San Leandro, Cal.	Best Tracklayer	20	40	.....	32 x 54	.....	11000	4,100	2 Cr.	.....	Own	4 Ver.
35		Best Tracklayer	38	75	.....	42 x 70	.....	28000	5,850	2 Cr.	.....	Own	4 Ver.
36	Bethlehem Motors Corp., Allentown, Pa.	Bethlehem	18	36	4	28 x 46	3100	6200	.....	2 Wh.	54	Beav.	4 Ver.
37	Blumberg Mfg. Co., San Antonio, Tex.	Blumberg	9	18	.....	.....	.....	2450	850	2 Wh.	40	Own	4 Ver.
38		Blumberg	12	24	.....	.....	.....	6400	1,250	2 Wh.	40	Own	4 Ver.
39	Boring Tractor Corp., Rockford, Ill.	Boring	...	20	.....	.....	.....	3550	1,485	2 Wh.	54	Wauk.	4 Ver.
40	Brillion Iron Works, Brillion, Wis.	Brillion	12	22	3	26	3000	4900	.....	2 Wh.	60	Field	4 Opp.
41	Buckeye Mfg. Co., Anderson, Ind.	Trundaar	20	35	4	.....	4000	9200	.....	2 Cr.	.....	Wauk.	4 Ver.
42	Buckeye Traction Ditcher Co., Findlay, Ohio.	Buckeye 40	16	30	.....	.....	.....	21000	5,500	2 Cr.	.....	Auto.	4 Ver.
43		Buckeye 60	24	45	.....	.....	.....	25000	6,500	2 Cr.	.....	Auto.	4 Ver.
44		Creeping Grip	15	25	.....	.....	3000	7000	2,000	2 Cr.	.....	Wauk.	4 Ver.
45	Bullock Tractor Co., Chicago,	Senior	35	50	.....	.....	6000	18000	4,500	2 Cr.	.....	Wauk.	4 Ver.
46		Giant	50	75	.....	.....	7500	20000	5,000	2 Cr.	.....	Wauk.	4 Ver.
47		Case	10	18	2-3	20 x 28	2080	3400	1,200	2 Wh.	42	Own	4 Ver.
48	J. I. Case T. M. Co., Racine, Wis.	Case	10	20	3	20 x 36	2330	5050	1,325	2 Wh.	52	Own	4 Ver.
49		Case	15	27	3-4	26 x 46	3000	5600	1,600	2 Wh.	52	Own	4 Ver.
50		Case	20	40	5-6	32 x 54	4400	14050	3,000	2 Wh.	66	Own	2 Opp.
51	Champion Tractor Co., Argo, Ill.	Champion	15	30	3	24	2750	3100	1,465	.....	48	Buda	4 Ver.
52	Chase Motor Truck Co., Syracuse, N. Y.	Chase	9	18	.....	.....	.....	4700	1,200	2 Wh.	48	Buda	4 Ver.
53	Cleveland Tractor Co., Cleveland, Ohio.	Cleveland	12	20	2	.....	1500	3200	1,585	2 Cr.	.....	Weid.	4 Ver.
54	C. O. D. Tractor Co., Minneapolis, Minn.	C. O. D.	13	25	3	.....	2500	6500	1,395	2 Wh.	70	Own	2 Hor.
55	Coleman Tractor Co., Kansas City, Mo.	Coleman	16	30	3	24	3000	5100	1,750	2 Wh.	44	Clim.	4 Ver.
56	Craig Tractor Co., Cleveland, Ohio.	Craig	15	25	3	28 x 46	3000	5000	.....	.....	44	Beav.	4 Ver.
57	Dart Truck & Tractor Corp., Waterloo, Iowa.	Blue J	15	30	3	24	3000	4500	1,750	2 Wh.	40	Buda	4 Ver.
58	Dauch Mfg. Co., Sandusky, Ohio.	Sandusky J	10	20	2-3	24	2000	4080	1,500	2 Wh.	48	Own	4 Ver.
59		Sandusky E	15	35	4	32	3000	8000	2,500	2 Wh.	56	Own	4 Ver.
60	Dayton-Disk Co., Quincy, Ill.	Leader B	12	18	2-3	24	2500	4800	1,000	2 Wh.	48	Own	2 Opp.
61		Leader C	18	36	4-6	32	4000	6600	2,250	2 Cr.	.....	Twin	4 Ver.
62		Capital 20	20	...	.....	.....	.....	12000	3,000	2 Wh.	53	Own	2 Opp.
63	C. H. A. Dissinger & Bro. Co., Wrightsville, Pa.	Capital 30	30	...	.....	.....	.....	14000	4,000	2 Wh.	60	Own	2 Opp.
64		Capital 45	45	...	.....	.....	.....	16000	4,400	2 Wh.	66	Own	2 Opp.
65	Eagle Mfg. Co. Appleton, Wis.	Eagle F	12	16	3	26	2400	5900	1,522	2 Wh.	48	Own	2 Hor.
66		Eagle	22	30	4	32	3700	7050	1,853	2 Wh.	52	Own	2 Hor.
67	Electric Wheel Co., Quincy, Ill.	Allwork	14	28	3	28	3000	5000	1,575	2 Wh.	48	Own	4 Ver.
68	Elgin Tractor Corp., Piqua, Ohio.	Elgin B	9	18	2	.....	1600	2900	1,075	2 Wh.	42	Buda	4 Ver.
69		Elgin NE	12	25	2-3	20	2000	3300	1,385	2 Wh.	42	Erd	4 Ver.
70		E-B 12-20 AA	12	20	3	24	2500	4355	.....	2 Wh.	54	Own	4 Ver.
71		E-B 9-16	9	16	2	18	1500	4260	.....	2 Wh.	54	Own	4 Ver.
72	Emerson-Brantingham Co., Rockford, Ill.	E-B 12-20	12	20	3	24	2000	6155	.....	2 Wh.	60	Own	4 Ver.
73		E-B 20-35	20	35	5	28	3300	10000	.....	2 Wh.	72	Own	4 Ver.
74		E-B 40-65	40	65	8-10	44	10000	23500	.....	2 Wh.	90	Own	4 Ver.
75	Evans Mfg. Co., Hudson, Ohio.	Evans K	20	35	4	32	3500	5500	1,985	2 Wh.	60	Buda	4 Ver.
76	Fageol Motors Co., Oakland, Cal.	Fageol	10	18	2	.....	1250	3000	1,295	2 Wh.	48	Over.	4 Ver.
77	Farm Horse Traction Works, Hartford, S. D.	Farm Horse	16	34	3	28	.....	4950	1,485	2 Wh.	48	Clim.	4 Ver.
78	A. B. Farquhar Co., Ltd., York, Pa.	Farquhar	15	25	3-4	27	2500	6000	.....	2 Wh.	54	Buda	4 Ver.
79		Farquhar	18	35	4-5	30	3600	10000	.....	2 Wh.	84	Own	4 Ver.

Abbreviations: **Traction**—Wh., wheel; Cr., crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; horisontal; Opp., opposed. **Fuel**—G, gasoline; K, kerosene; D, distillate. **Carbureter**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Holl., Holley. **Magneto**—A-K, Atwater Kent; Sum., Sumter; Eise., Eisemann; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; jaw clutch. **Final drive**—S. G., spur gear; G., gear; Ch., chain. **Drive**—Op., open; In., inclosed.

and Their Technical Specifications

These tables are revised and brought up to date monthly

Line No.	Bore and stroke	Normal R. P. M.	Fuel	Make and size of carbureter	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Gearset type	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range, M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line No.
1	4½x 6	850	G-K	1½-King.	.....	K-W	Own	.....	Sl. G.	14	900	3300	2	2¼-3⅛	2½	S. G.	Op.	.....	1
2	4½x 6	850	G-K	1½-King.	.....	K-W	Own	.....	Sl. G.	14	900	3300	2	.....	2½	S. G.	Op.	.....	2
3	.....	375	G-K	.....	.....	Web.	Own	.....	Ch.	14-18	950	.....	1	.....	2¼	Ch.	Op.	.....	3
4	6 x 8	560	K-D	2 -Own	Donal.	Bosch	Own	.....	Sel. G.	19	560	2790	2	2.1-3.26	2.1	S. G.	Op.	No	4
5	7 x 8½	530	K-D	2⅜-Own	Donal.	Bosch	Own	Own	Sel. G.	23	530	3190	2	2.1-3	2.1	S. G.	Op.	No	5
6	8 x10	450	K-D	2¾-Own	Donal.	Bosch	Own	Own	Sel. G.	26	450	3060	2	2-3.2	2	S. G.	Op.	No	6
7	10 x12	375	K-D	3¼-Own	.....	Bosch	Own	.....	.....	36	375	3540	1	1.9	1.9	S. G.	Op.	No	7
8	4¾x 6½	830	G-K	.....	Ben.	.....	Own	Own	Sel.	15	.....	2600	2	2.3-2.8	2.3	S. G.	In.	Yes	8
9	5¼x 7	720	G-K	1½-King.	Ben.	K-W	Own	Own	Sel. G.	14½	720	2600	1	2.3	2.3	S. G.	Op.	Yes	9
10	3⅛x 4½	1000	G	.....	Ben.	.....	B & B.	Own	.....	10	1000	2600	.....	1½-2.8	2.3	S. G.	Op.	Yes	10
11	4 x 5	1000	G	1¼-Krice	.....	Bosch	Own	.....	Fr.	12	800	2500	3	.....	2¼	Ch.	Op.	Yes	11
12	4¼x 5¾	900	G-K	1¼-Scheb.	Ben.	Bosch	B. & B.	Nutt.	Sl. G.	12	825	2600	2	2-3½	2 ½	G.	Op.	Yes	12
13	4¼x 6¾	900	G-K	1⅜-King.	Ben.	Eise.	Own	Own	S. G.	20	450	2250	1	2.25	2¼	S. G.	Op.	Yes	13
14	5½x 8	600	G-K	2 -King.	.....	Eise.	Own	Own	S. G.	20	600	3100	2	2.13-2.93	2.93	S. G.	Op.	No	14
15	7 x 9	500	G-K	2½-King.	.....	Eise.	Own	Own	S. G.	24	500	3100	1	2.2	2.2	S. G.	Op.	No	15
16	2⅞x 4⅛	1000	G-K	.....	Orem	K-W	Own	.....	.....	6	1440	2600	1	2½	.....	.....	.....	Yes	16
17	4 x 5	1000	G-K	.....	Orem	K-W	Own	.....	.....	8	1300	2600	2	2 ½-3 ½	.....	.....	.....	No	17
18	4¼x 6	900	G-K	.....	Orem	K-W	Own	.....	.....	9½	965	2600	2	1½-3½	.....	.....	.....	No	18
19	5 x 7	800	G-K	1½-Ben.	Orem	K-W	Own	Own	Sel. G.	20	500	2600	2	1⅝-3	2	G.	Op.	No	19
20	6 x 7½	750	G-K	.....	Orem	K-W	Own	.....	.....	20	500	2600	2	1⅝-3	.....	.....	.....	No	20
21	3¾x 5⅛	1000	G-K	1¼-King.	.....	Eise.	B. & B.	Own	Sel. G.	10	1000	.....	2	2⅝-5¼	2⅝	G.	In.	Yes	21
22	3 x 4	1200	G-K	¾-King.	None	K-W	Own	Own	Sl. G.	5¼	1000	2360	4	1½-4½	1½	S. G.	Op.	No	22
23	3 x 4	1200	G-K	¾-King	None	K-W	Own	Own	Sl. G.	9	1000	.....	2	1-3	.....	.....	.....	.....	23
24	5½x 6	600	G-K-D	1¼-King.	None	K-W	Own	Own	Sl. G.	18	600	2830	2	1¾-3	1¾	S. G.	Op.	No	24
25	6¼x 7	570	G-K-D	1½-King.	None	K-W	Own	Own	Sl. G.	19½	570	2880	2	1¾-2¾	1¾	S. G.	Op.	No	25
26	4⅝x 7	650	G-K-D	1¼-King	None	K-W	Own	Own	Sl. G.	16	700	.....	2	1¾-2¾	1¾	S. G.	Op.	No	26
27	5½x 6	650	G-K-D	1½-King.	None	K-W	Own	Own	Sl. G.	18	650	3000	2	2-3	2	S. G.	Op.	No	27
28	6½x 7	500	G-K-D	2 -King.	None	K-W	Own	Own	Sl. G.	22	500	2880	2	2-3	2	S. G.	Op.	No	28
29	7¾x 8	500	G-K-D	2 -King.	None	K-W	Own	Own	Sl. G.	26	500	3400	2	1¾-2 ¾	2	S. G.	Op.	No	29
30	4⅝x 5½	800	K	1½-Own	Own	Dixie	Own	Own	Sl. G.	10	800	.....	3	1¼-6	2½	S. G.	.....	No	30
31	3⅛x 4½	1200	D	1 -Mayer	Donal.	Bosch	Own	Own	S. G.	12	600	1900	2	1½-2 ½	1	G.	In.	.....	31
32	3¾x 5¼	1000	G-D	1 -King.	Ben.	Dixie	Own	.....	Sl. G.	10	1000	2500	2	2½-3½	2½	S. G.	Op.	Yes	32
33	4⅝x 5¼	700	G-D	1½-Ens.	Ben.	Dixie	Own	Own	Sl. G.	10	700	1750	2	2-3	3	G.	In.	No	33
34	6¼x 6¼	600	D	1½-Ens.	Ben.	Dixie	Own	Own	Sl. G.	.....	.....	.....	3	.....	2½	G.	In.	.....	34
35	7¾x 9	435	D	2 -Ens.	Ben.	Dixie	Own	Own	Sl. G.	.....	.....	.....	3	.....	2⅝	G.	In.	.....	35
36	4¾x 6	900	K	Strom.	Ben.	Bosch	.....	.....	Sl. G.	10	1278	.....	2	1.8-3.3	.....	S. G.	In.	.....	36
37	3¾x 3¾	750	G	.....	Holl.	Dixie	.....	Foote	Sl. G.	10	600	1550	2	1-4	3	G.	In	Yes	37
38	3⅜ x 5	750	G	1¼-Strom.	Holl.	Dixie	.....	Foote	Sl. G.	16	600	2480	2	1-4	3	G.	In.	Yes	38
39	4¼x 5¼	1000	G-K	1¼-	Ben.	King.	.....	.....	Sl. G.	10	435	1140	2	1-5	.....	Ch.	Op.	Yes	39
40	3¾x 5	1000	K	1¼-King.	Own	Dixie	Bier.	Foote	Sl. G.	8	1000	2100	3	2-5	2	G.	Op.	No	40
41	4¾x 6¾	950	G-K-D	1½-Deppe	.....	Bosch	.....	Own	S. G.	10	950	2650	2	3.1-8	2½	S. G.	In.	.....	41
42	6⅛x 8	500	G-K	1½-Ben.	Ben.	K-W	Own	Own	G.	14	250	1000	4	3.1-8	.....	Ch.	Op.	.....	42
43	7½x 9	500	G-K	2 -Ben.	Ben.	K-W	Own	Own	G.	14	222	870	1	2½	.....	Ch.	Op.	.....	43
44	4¾x 6¾	900	G-K	1¼-Ben.	Ben.	Dixie	B. & B.	Own	Sl. G.	12	600	1875	3	1¾-3½	2¼	.....	.....	No	44
45	5½x 7½	850	G-K	.....	Ben.	Dixie	B. & B.	Own	Sl. G.	15	600	2250	3	1¼-3½	.....	.....	.....	No	45
46	7¼x 9 ½	.....	G-K	.....	Ben.	Dixie	B. & B.	Own	Sl. G.	14	60	220	2	2¼-3½	.....	.....	.....	No	46
47	3⅛x 5	1050	K	1⅛-King.	Own	King.	Own	Own	Sl. G.	14¼	1050	3900	2	2¼-3½	2¼	S. G.	In.	No	47
48	4¼x 6	900	K	1¼-King.	Own	King.	Own	Own	Sl. G.	17	900	4000	1	2¼	2¼	S. G.	Op.	No	48
49	4½x 6	900	K	King.	Own	King.	Own	Own	Sl. G.	16	900	3762	2	2-3½	2¼-3½	S. G.	Op.	No	49
50	8¾x 9	475	K	2½-King.	.....	K-W	Own	Own	Sl. G.	24	475	2980	2	2-3	2	S. G.	Op.	No	50
51	4¼x 5½	1000	G-K	1¼ Case	.....	Dixie	.. ....	Fuller	Sl. G.	12	850	2600	3	1½-4¼	2½	.....	.....	.....	51
52	3¾x 5½	900	G	1¼-Holl.	.....	King.	Bier.	Own	Sl. G.	8	900	1885	2	1½-2½	1½	G.	Op.	No	52
53	3¾x 5½	1200	G-K	1⅛-King.	Own	Eise	Own	B. & S.	S. G.	8	1200	2500	2	1¾-2½	3½	G.	In.	No	53
54	6½x 7	550	K	1½-King.	.....	K-W	Own	.....	S. G.	18	530	2500	3	.....	.....	S. G.	In.	Yes	54
55	5 x 6½	800	G-K	1¼-Strom	Ben.	Dixie	B. & B.	.....	.....	12	800	2100	2	1¼-4	3	Worm	In.	Yes	55
56	4¾x 6	950	K	1½-Strom.	Ben.	Berl.	.....	Covert	S. G.	12	830	2610	2	24-3.86	2-4	S. G.	In.	Yes	56
57	4¼x 5¼	1050	G	1¼ Zen.	Ben.	Dixie	Fuller	Own	Sl. G.	12	750	2355	3	1¼-6	2½	.....	In.	No	57
58	4¼x 5¼	985	G-K	1¼-King.	Ben.	Dixie	Own	Own	Sel. G.	10	975	2577	3	2-5	2-3	S. G.	Op.	Yes	58
59	5 x 6½	750	G-K	2 -King	Ben.	Dixie	Own	Own	Sel. G.	15	750	2945	2	2½-3½	3-4½	S. G.	Op.	No	59
60	6¼x 6	750	K	1½-King.	Own	King.	Own	Own	Sel. G.	14	750	2750	2	1 8-3	1.8	G.	Op.	Yes	60
61	5 x 7½	700	K	1¾-King	Ben.	K-W	Own	Own	Sel. G.	14	700	2600	3	.....	1.8	Ch.	Op.	No	61
62	8½x12	300	.....	.....	.....	.....	.....	.....	.....	36	300	.....	.....	.....	.....	.....	.....	.....	62
63	9 x14	300	.....	.....	.....	.....	.....	.....	.....	36	300	.....	.....	.....	.....	.....	.....	.....	63
64	10½x15	250	.....	.....	.....	.....	.....	.....	.....	40	250	.....	.....	.....	.....	.....	.....	.....	64
65	7 x 8	425	K	1½-Linga.	.....	Dixie	Own	Own	Sl. G.	20	450	2250	2	2-3	2	G.	In.	Yes	65
66	8 x 8	425	K	2 -Linga.	.....	Dixie	Own	Own	Sl. G.	24	450	2678	2	2-3	2	G.	In.	Yes	66
67	5 x 6	800	K	1½-King.	Ben.	King.	Own	Own	Sl. G.	12	800	2514	2	1¼-2.4	2.4	S. G.	In.	Yes	67
68	3¾x 5½	1000	G	.....	Own	King.	Own	.....	Fr.	9	1000	2360	7	.....	3	Ch.	In.	Yes	68
69	4 x 6	1000	G-K	-King	Ben.	Dixie	Own	.....	Fr.	9	1000	2600	6	1¼-3½	3	Ch.	In.	Yes	69
70	4¾x 5	900	K	.....	Ben.	K-W	Own	.....	Sl. G.	12	900	2800	2	1.81-2.33	.....	G.	In.	No	70
71	4¾x 4½	800	K	1¼-Ben.	Ben.	K-W	Own	.....	Sl. G.	12	800	2500	2	1.72-2.33	.....	G.	In.	No	71
72	4¾x 5	850	K	1½-Ben.	Ben.	K-W	Own	.....	Sl. G.	14	708	2225	2	1.71-2.25	.....	G.	In.	Yes	72
73	5 x 7	700	K	1½-Ben.	Ben.	K-W	Own	.....	Sl. G.	16¾	600	2500	2	1.71-2.26	.....	G.	In.	No	73
74	7¼x 9	500	K	2½-Ben.	Ben.	K-W	Own	.....	Sl. G.	22	500	2880	1	2	2	G.	In.	No	74
75	4½x 6	1000	G	1½-Ray.	Holl.	Dixie	B. & B.	Own	Sel. G.	24	415	2000	2	2¼-4½	2½	G.	In.	Yes	75
76	3¾x 5	1100	G-K	Till.	Own	Berl.	Own	Own	G.	6	.....	.....	1	2 ½-2¾	2 ½	G.	Op.	Yes	76
77	5 x 6½	800	D	1½-King.	Ben.	Dixie	Bier.	Own	Sl. G.	14	800	.....	2	1-4	3	Ch.	In.	No	77
78	4½x 6	900	G-K	1½-King.	Ben.	K-W	Own	Nutt.	Sel. G.	14	800	2000	2	1-4	.....	G.	In.	.....	78
79	6 x 8	550	G-K	2 -King	.....	K-W	Own	.....	.....	32	275	2309	2	1-2.3	.....	G.	Op.	.....	79

Auto., Automatic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Cr.,Carter; Perr., Perrin-Ingram. **Air Cleaner**—Donal., Donaldson; Ben., Bennett; pec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., sliding

Motor Age Monthly Guide to Tractors and

Line No.	Manufacturer	Tractor	Drawbar horsepower	Belt horsepower	No. plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of Engine	Cylinders
80	A. B. Farquhar Co., Ltd., York, Pa.	Farquhar	25	50	6-7	33	5000	19000	.....	2 Wh.	84	Own	4 Ver.
81	Henry Ford & Son, Inc., Dearborn, Mich.	Fordson	12	20	2	.....	1800	2700	.....	2 Wh.	42	Own	4 Ver.
82	Four Drive Tractor Co., Big Rapids, Mich.	Fitch	20	35	4	28-32	3200	6000	$2,500	4 Wh.	42-36	Clim.	4 Ver.
83	Frick Co., Waynesboro, Pa.	Frick	12	25	3	27	3000	5800	.....	2 Wh.	60	Erd	4 Ver.
84	Fulton Tractor Co., Anderson, Ind.	Fulton	10	....	2	.....	.....	2500	1,275	2 Wh.	56	Wauk.	4 Ver.
85	Gile Engine & Tractor Co., Ludington, Mich.	Gile Q	18	....	4-5	36	3500	7000	.....	2 Wh.	60	Own	4 Ver.
86	Gray Tractor Co., Minneapolis, Minn.	Gray	18	36	4	30	3750	6200	2,250	Drum	54	Wauk.	4 Ver.
87	Hart-Parr Co., Charles City, Iowa.	New Hart-Parr	15	31	3	28	3000	5300	1,395	2 Wh.	52	Own	2 Hor.
88	Hession Tiller & Tractor Corp., Buffalo, N. Y.	Wheat	12	24	.....	.....	3000	4200	1,695	2 Wh.	48	Erd	4 Ver.
89	Hollis Tractor Co., Pittsburgh, Pa.	Hollis	15	25	3	.....	3000	2750	1,375	2 Wh.	30	Light	4 Ver.
90	Holt Mfg. Co., Peoria, Ill.	Caterpillar	25	45	.....	.....	5000	13600	.....	2 Cr.	.....	Own	4 Ver.
91		Caterpillar	40	75	.....	.....	9300	25000	.....	2 Cr.	.....	Own	4 Ver.
92	Huber Mfg. Co., Marion, Ohio.	Huber Light Four	12	25	3	22	2300	5000	1,285	2 Wh.	60	Wauk.	4 Ver.
93	Illinois Tractor Co., Bloomington, Ill.	C	18	36	4	32	.....	5000	2,150	2 Wh.	54	Clim.	4 Ver.
94	Imperial Machine Co., Minneapolis, Minn.	Imperial	40	70	.....	.....	7500	20800	4,500	2 Wh.	96	Own	4 Opp.
95	Indiana Silo Co., Anderson, Ind.	Indiana	5	10	.....	.....	1000	1700	900	2 Wh.	50	Le Roi	4 Ver.
96	International Harvester Co., Chicago,	Titan	10	20	3	24	1800	5700	1,225	2 Wh.	54	Own	2 Hor.
97		Mogul	10	20	3	24	1800	5500	1,125	2 Wh.	54	Own	1 Hor.
98		International	15	30	4	28	2350	9000	.....	2 Wh.	66	Own	4 Ver.
99	Joliet Oil Tractor Co., Joliet, Ill.	Bates Steel Mule	12	20	3	28	.....	4300	.....	2 Cr.	.....	Erd	4 Ver.
100	Kansas City Hay Press Co., Kansas City, Mo.	Prairie Dog	9	18	2	.....	1500	3000	1,250	1 Wh.	48	Wauk.	4 Ver.
101	Keck-Gonnerman Co., Mount Vernon, Ind.	Keck-Gonnerman	12	24	3	24	.....	6500	1,500	2 Wh.	61	Own	2 Hor.
102	Kinnard & Sons Mfg. Co., Minneapolis, Minn.	Flour City Jr.	14	24	3	.....	.....	6800	.....	2 Wh.	60	Own	4 Ver.
103		Flour City	20	35	4-6	.....	.....	10000	.....	2 Wh.	72	Own	4 Ver.
104		Flour City	30	50	6-8	.....	.....	14000	.....	2 Wh.	84	Own	4 Ver.
105		Flour City	40	70	8-10	.....	.....	21000	.....	2 Wh.	96	Own	4 Ver.
106	La Crosse Tractor Co., La Crosse, Wis.	Happy Farmer, F	12	24	3	24	2000	3800	1,150	2 Wh.	56	Own	2 Hor.
107		La Crosse G	12	24	3	24	2000	4000	1,250	2 Wh.	56	Own	2 Hor.
108	Lang Tractor Co., Minneapolis, Minn.	Lang	15	30	.....	.....	3000	4500	1,485	2 Wh.	50	Clim.	4 Ver.
109	Lauson, John, Mfg. Co., New Holstein, Wis.	Lauson	15	25	3-4	28	.....	6000	1,985	2 Wh.	54	Beav.	4 Ver.
110	Leader Tractor Mfg. Co., Des Moines, Iowa.	Rex	12	25	3	20-22	2400	5500	1,800	2 Wh.	60	Wauk.	4 Ver.
111	Leonard Tractor Co., Jackson, Mich.	Leonard	20	30	3	28	4000	5000	2,000	4 Wh.	50	Buda	4 Ver.
112	Lombard Auto Tractor Truck Corp., New York.	Lombard	.....	.....	.....	.....	1900	.....	.....	2 Cr.	.....	Own	6 Ver.
113	Liberty Tractor Co., Minneapolis, Minn.	Liberty	15	30	.....	.....	.....	5775	.....	4 Wh.	48	Clim	4 Ver.
114	Little Giant Co., Mankato, Minn.	Little Giant B	16	22	3-4	26	.....	5200	1,650	2 Wh.	54	Own	4 Opp.
115		Little Giant A	26	35	5-6	32	.....	8700	2,500	2 Wh.	66	Own	4 Opp.
116	Midwest Engine Co., Indianapolis, Ind.	Atlas	16	26	3	24	2800	5100	1,750	2 Wh.	66	Wauk.	4 Ver.
117	Minneapolis Steel & Machinery Co., Minneapolis, Minn.	Twin City 12	12	20	3	20	2000	4000	.....	2 Wh.	50	Own	4 Ver.
118		Twin City 16	16	30	4	24	3000	7800	.....	2 Wh.	54	Own	4 Ver.
119		Twin City 25	25	45	6	32	4700	16000	.....	2 Wh.	76	Own	4 Ver.
120		Twin City 40	40	65	8-10	36	7500	23700	.....	2 Wh.	84	Own	4 Ver.
121		Twin City 60	60	90	12-15	.....	11250	28000	.....	2 Wh.	84	Own	6 Ver.
122	Moline Plow Co., Moline, Ill.	Moline Universal D	9	18	2	.....	2000	3300	1,500	2 Wh.	52	Own	4 Ver.
123	Monarch Tractor Co., Watertown, Wis.	Lightfoot	6	10	1-2	.....	1100	3200	1,250	2 Cr.	.....	Kenn.	4 Ver.
124		Neverslip M	12	20	3	24	2200	6200	1,850	2 Cr.	.....	Erd	4 Opp.
125		Neverslip N	18	30	4	28	3300	7400	2,250	2 Cr.	.....	Doman	4 Ver.
126	National Tractor Co., Cedar Rapids, Iowa.	National E	9	16	2	22	1800	3800	1,075	2 Wh.	46	Wauk.	4 Ver.
127		National F	14	27	3	26	2250	4200	1,585	2 Wh.	46	Wauk.	4 Ver.
128	Nilson Tractor Co., Minneapolis, Minn.	Nilson Junior	16	25	3-4	24	3000	5000	1,775	2 Wh.	50	Wauk.	4 Ver.
129		Nilson Senior	24	36	4-5	30	4000	6400	2,475	2 Wh.	52	Wauk.	4 Ver.
130	Ohio Mfg. Co., Upper Sandusky, Ohio.	Whitney	9	18	2	20	1600	3000	1,175	2 Wh.	48	Gile	2 Opp.
131	Parrett Tractor Co., Chicago,	Parrett F	12	25	3	24	2600	5200	.....	2 Wh.	60	Buda	4 Ver.
132		Parrett H	12	25	3	24	2600	5350	.....	2 Wh.	60	Buda	4 Ver.
133	Peoria Tractor Corp., Peoria, Ill.	Peoria J	12	25	3	24	3000	5100	1,985	2 Wh.	56	Clim.	4 Ver.
134	Pioneer Tractor Co., Winona, Minn.	F	15	30	4	28	.....	8500	.....	2 Wh.	60	Own	4 Opp.
135		C	30	60	10	36	.....	23500	.....	2 Wh.	96	Own	4 Opp.
136	Port Huron Engine & Thresher Co., Port Huron, Mich.	Port Huron	12	25	3	22	2200	5700	1,600	2 Wh.	56	Erd	4 Ver.
137	Power Truck & Tractor Co.,	Power, E.	15	30	3	24-28	2500	4250	1,485	2 Wh.	60	Own	1 Hor.
138	Rock Island Plow Co., Rock Island, Ill.	Heider D	9	16	2	18	1500	4000	1,070	2 Wh.	54	Wauk.	4 Ver.
139		Heider C	12	20	3	24	2000	6000	1,395	2 Wh.	57	Wauk.	4 Ver.
140	Royer Ensilage Harvester Co., Wichita, Kan.	Royer	12	25	.....	.....	2200	4600	1,225	2 Wh.	54	Erd	4 Ver.
141	Russell & Co., The, Massillon, Ohio.	Junior	12	24	2	18	2000	6200	.....	2 Wh.	53	Wauk.	4 Ver.
142		Little Boss	15	30	3	24	3000	6900	.....	2 Wh.	53	Wauk.	4 Ver.
143		Big Boss	20	40	4	30	4000	7600	.....	2 Wh.	60	Model	4 Ver.
144		Giant	30	60	8	40	8000	24000	.....	2 Wh.	84	Own	4 Ver.
145	Scientific Farming Machinery Co., Minneapolis, Minn.	Princess Pat	10	18	.....	22	1500	1900	1,185	.....	40	Wauk.	4 Ver.
146	Short Turn Tractor Co., Bemidji, Minn.	Short Turn	30	....	3	.....	5000	.....	.....	2 Wh.	51	Erd	4 Ver.
147	Square Turn Tractor Co., Norfolk, Neb.	Square Turn	18	35	.....	.....	3200	7800	1,875	2 Wh.	61	Clim.	4 Ver.
148	Stinson Tractor Co., Minneapolis, Minn.	Stinson	18	36	4	32	4750	6550	.....	4 Wh.	60	Beav.	4 Ver.
149	Topp-Stewart Tractor Co., Clintonville, Wis.	B	20	35	4-6	30	4500	6500	3,000	4 Wh.	42	Wauk.	4 Ver.
150	Turner Mfg. Co., Port Washington, Wis.	Turner-Simplicity	12	20	2-3	24	2300	4000	1,395	2 Wh.	54	Wauk.	4 Ver.
151		Turner-Simplicity	14	25	3-4	28	2600	4400	1,675	2 Wh.	54	Buda	4 Ver.
152	U. S. Tractor Co., Minneapolis, Minn.	U. S. B	12	22	.....	.....	2000	3900	975	2 Wh.	60	Gile	2 Opp.
153		U. S. C	18	30	.....	.....	3000	4100	1,450	2 Wh.	60	Erd	4 Ver.
154	Wallis Tractor Co., Racine, Wis.	Cub Junior	15	25	2-3	24	2000	3250	.....	2 Wh.	48	Own	4 Ver.
155	Waterloo Gasoline Engine Co., Waterloo, Iowa.	Waterloo Boy	12	25	3	24	2000	6000	.....	2 Wh.	52	Own	2 Hor.
156	Wichita Tractor Co., Wichita, Kan.	A	8	16	2-3	.....	1500	3500	1,025	2 Wh.	60	Gile	2 Opp.
157	Wisconsin Farm Tractor Co., Sauk City, Wis.	E	16	32	3-4	28	3500	5240	2,250	2 Wh.	52	Clim.	4 Ver.
158	Yuba Mfg., Co., Marysville, Cal.	Yuba Ball Tread	12	20	.....	.....	5000	6750	2,900	2 Cr.	.....	Wauk.	4 Ver.
159		Yuba Ball Tread	20	35	.....	.....	5000	10250	4,700	2 Cr.	.....	Wis.	4 Ver.
160	Zelle Tractor Co., St. Louis, Mo.	Zelle	12	25	2-4	24	2000	3800	.....	2 Wh.	54	.....	4 Ver.

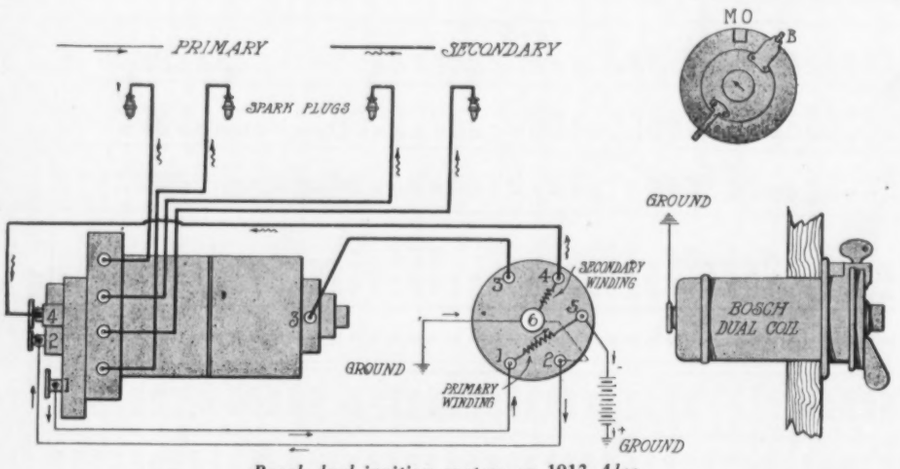
Abbreviations: **Traction**—Wh., wheel; Cr., crawler. **Engine**—Beav., Beaver; Veer., Veerac; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Auto Opp., opposed. **Fuel**—G, gasoline; K, kerosene; D, distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Zeph., Zephyr; Eas., Atwater Kent; Sum., Sumter; Eise., Eisemann; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. **Gearset**—B. & spur gear; G., gear; Ch., chain; R. P., roller pinion. **Drive**—Op., open; In., inclosed.

Their Technical Specifications—Concluded

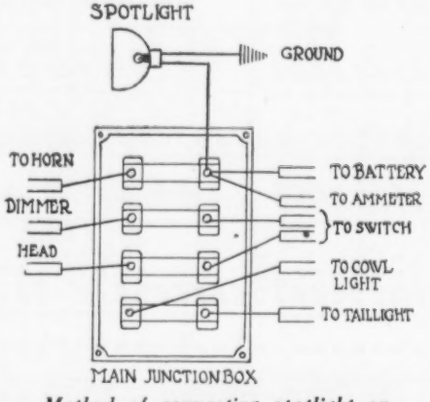
Line No.	Bore and stroke	Normal R. P. M.	Fuel	Make and size of carbureter	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Gearset type	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range, M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line No.
80	7 x 8	550	G-K	2 -King.	.....	K-W	Own	.....	.....	32	275	2300	2	1-2.3	.....	G.	On.	.....	80
81	4 x 5	1000	K	Holl.	Own	Own	Own	S. G.	9	1000	2500	3	1-15	2½	Worm	In.	Yes	81
82	5½x 6½	800	G-K	1-½King.	Own	K-W	B. & B.	.....	Sl. G.	14	750	2750	3	1½-4	2½	S. G.	Op.	Yes	82
83	4 x 6	900	K	1¼-King.	Ben.	King.	Own	Nutt.	Sl. G.	13	900	3075	2	2.3-3.8	2.3	G.	Op.	Yes	83
84	3½x 5¼	1150	G-K	1-King.	.....	King.	.....	.....	Fr.	.....	.....	.....	.....	1-15	2½-3	Ch.	Op.	Yes	84
85	4¾x 6½	875	G	1¾-Ben.	Own	Dixie	Own	Own	.....	16	500	2100	2	2½-3	.....	G.	In.	.....	85
86	4¾x 6¾	850	G-K	1½-Ben.	Ben.	K-W	Own	.....	Sl. G.	11	850	2600	2	2-2½	2½	Ch.	In.	No	86
87	6½x 7	750	K	1½-Scheb.	.....	K-W	Own	Own	Sl. G.	14	750	2750	2	1¾-3.8	3	G.	Op.	Yes	87
88	4 x 6	1000	G-K	King.	Ben.	Dixie	B. & B.	.....	Sl. G.	13	.....	2600	2	2¼-4	3	G.	Op.	Yes	88
89	3¼x 4½	1600	G-K	1¼-Zen.	Ben.	Dixie	Own	Own	Plan.	12	800	2400	3	1¾-7	2½	G.	In.	No	89
90	6 x 7	600	G-D	1½-King.	Donal.	K-W	Own	Own	Sl. J. C.	14	625	2290	2	2½-3½	2½	G.	In.	No	90
91	7½x 8	550	G-D	2-King.	Donal.	K-W	Own	Own	Sl. J. C.	16	467	2649	2	2½-3	2¼	Ch.	In.	No	91
92	4¼x 5¾	900	G-K	1¼-King.	Own	King.	Own	Own	S. G.	13	900	3063	2	2½-4	2 ½	G.	Op.	Yes	92
93	5 x 6½	400	K	1½-Strom.	Ben.	Dixie	Cotta	Foote	S. G.	14	600	2250	2	1½-3½	2½	.....	.....	No	93
94	7½x 9	400	G-K	2 -King.	Ben.	Dixie	Own	.....	S. G.	30	400	3200	2	1½-2¼	2¼-2½	G.	Op.	No	94
95	3½x 4½	950	G	1 -Scheb.	Ben.	A-K	Own	Own	Sl. G.	6	1200	1880	4	2.1-3.6	2½	Ch.	Op.	Yes	95
96	6½x 8	500	K-D	Own	Own	K-W	Own	Own	S. G.	20	500	2600	2	1.8-2.5	2.5	Ch.	Op.	No	96
97	8½x12	400	K-D	Own	Own	K-W	Own	Own	S. G.	20	400	2060	2	1.8-2.5	1.8-2.5	Ch.	Op.	No	97
98	5¼x 8	575	K-D	Own	Own	K-W	Own	Own	S. G.	18	575	2800	2	1.8-2.4	2.4	Ch.	In.	No	98
99	4 x 6	900	G-K	1½-Ben.	Ben.	Eise.	B. & B.	.....	Sl. G.	12	725	2300	2	2¼-4	2⅜	G.	In.	Yes	99
100	3¾x 5¼	950	G-K	1-Ben.	Ben.	Dixie	Own	Own	S. G.	10	950	2500	2	2⅝-6	2¾	G.	In.	Yes	100
101	6½x 8	.....	K	1½-Scheb.	Ben.	K-W	Own	Own	Sl. G.	16	650	2700	2	2-4½	2½	G.	In.	Yes	101
102	5 x 5	800	K	1½-Scheb.	.....	A-K	.....	Own	.....	24	320	.....	2	2.2-3.25	.....	G.	.....	.....	102
103	5¼x 6	800	K	1½-Scheb.	.....	A-K	.....	Own	.....	28	350	.....	1	2¼	.....	G.	.....	.....	103
104	6¼x 7	600	K	2 -Scheb.	.....	K-W	.....	Own	.....	32	275	.....	1	2¼	.....	G.	.....	.....	104
105	7½x 8	450	K	2 -Scheb.	.....	A-K	.....	Own	.....	34	275	.....	1	2¼	.....	G.	.....	.....	105
106	6 x 7	750	K	1½-King.	Own	.....	Own	Own	Sl. G.	11	750	2100	1	2½	2½	G.	Op.	Yes	106
107	6 x 7	750	K	1½ King	Ben.	.....	Own	Own	Sl. G.	11	750	2100	1	2½	2½	G.	Op.	Yes	107
108	5 x 6½	650	G-K	1¼-Ray.	Ben.	Dixie	.....	Own	.....	14	800	2600	2	2½-5	.....	Ch.	In.	Yes	108
109	4½x 6	950	G-K	1⅜-King	Own	Dixie	Own	Nutt.	Sel. G.	18	475	2200	2	1½-3	2½	G.	In.	Yes	109
110	4¼x 5¾	900	K	1¼ King.	.....	Eise.	Bier.	.....	Sel. G.	12	900	.....	2	2½-4	2½	G.	.....	Yes	110
111	4½x 6	1000	G-K	1½-Zen.	Own	Dixie	Own	Own	Sel. G.	16	597	2500	2	1½-4	2.7	G.	In.	No	111
112	5¾x 7	.....	G	2½-Any	.....	Dixie	Spec.	Spec.	Sel. G.	.....	.....	.....	3	.....	2-4	Worm	In.	.....	112
113	5 x 6½	.....	.....	Strom.	.....	Dixie	.....	.....	.....	12	900	2600	2	2½-4½	.....	.....	.....	Yes	113
114	4¼x 5	900	K	1¼-King.	Own	K-W	Own	Own	Sl. G.	9	900	2100	3	1½-6	3	G.	In.	No	114
115	5¼x 6	750	K	1½-King.	Own	K-W	Own	Own	Sl. G.	13	750	2500	3	1½-6	3	G.	In.	No	115
116	4¼x 5¾	1000	G-K	1¼-King.	Own	Dixie	Own	Own	Sl. J. C.	12	800	2512	2	2-3	2.5	S. G.	Op.	No	116
117	4¼x 6	1000	K	1¼-H-S	Ben.	Bosch	B. & B.	.....	Sl. G.	16	650	.....	2	2.2-2.9	.....	.....	In.	Yes	117
118	5 x 7½	650	G-K	1¾-King.	Ben.	K-W	Own	Own	Sl. G.	17	528	2400	2	2-2¾	2-2¾	S. G.	In.	No	118
119	6¼x 8	600	G-K	2 -King.	.....	K-W	Own	Own	Sl. G.	20	600	3150	2	1.4-2	2	S. G.	Op.	No	119
120	7¼x 9	500	G-K	2½-King.	.....	K-W	Own	.....	.....	23	500	2900	1	2	2	S. G.	Op.	No	120
121	7¼x 9	500	G-K	3 -King.	.....	K-W	Own	.....	.....	23	500	2900	1	2	2	S. G.	Op.	No	121
122	3½x 5	1800	G	1¼-Holl.	Ben.	Remy	B. & B.	Own	Sl. G.	9	1200	2900	1	3½	3-3½	S. G.	In.	Yes	122
123	3¾x 4	900	G-K	1 -King.	Ben.	K-W	Bier.	Foote	Sel. G.	.....	750	.....	1	2	2	Ch.	Op.	No	123
124	4 x 6	800	G-K	1¼-King.	Ben.	K-W	Bier.	Foote	Sel. G.	.....	500	.....	2	1½-2¼	2	Ch.	Op.	No	124
125	4¾x 6	800	G-K	1½-King.	Ben.	K-W	Own	Own	Sel. G.	.....	565	.....	2	½-2¼	1⅞	Ch.	Op.	No	125
126	3½x 5¼	1000	G-K	1 -Ben.	Ben.	.....	Rock.	Own	Fr.	10	600	.....	6	2-3½	2-2½	S. G.	In.	Yes	126
127	4½x 5¾	900	K	1¼-King.	Ben.	Eise.	Rock.	Own	Fr.	10	1000	.....	6	2-3½	2-2½	S. G.	In.	Yes	127
128	4¼x 5¾	900	G-K	1⅜-King.	Ben.	K-W	Own	Own	Sel. G.	20	400	1992	2	2½-5½	2½	Ch.	In.	Yes	128
129	4¾x 6¾	800	G-K	1¼-King.	Ben.	K-W	Own	Own	Sel. G.	24	360	2160	2	2½-5½	2½	Ch.	In.	Yes	129
130	5½x 6½	750	G	1½-Ben.	.....	Dixie	Own	Own	Sel. G.	11	750	2100	3	1¾-4	2½	Ch.	Op.	No	130
131	4¼x 5½	1000	K	1¼-King.	Own	Eise.	Own	.....	Sl. G.	12	1000	3140	2	2¾-4	.....	S. G.	Op.	Yes	131
132	4¼x 5½	1000	K	1¼-King.	Own	Eise.	Own	.....	Sl. G.	12	1000	3140	3	1¾-4	.....	S. G.	In.	Yes	132
133	5 x 6½	750	K	1½-Strom.	Ben.	Eise.	B. & B.	Nutt.	Sl. G.	14	650	2450	2	2½-4	2¼-2½	G.	.....	Yes	133
134	5½x 6	750	K	1½-King.	Ben.	K-W	Own	Own	Sl. G.	14	750	2750	3	1¾-4	2½	Ch.	In.	Yes	134
135	7 x 8	600	K	2 -King.	Ben.	K-W	Own	Own	Sl. G.	18	600	2700	3	1¾-4	2¼	S. G.	In.	No	135
136	4 x 6	900	G-K	1¼-King.	Ben.	King.	.....	.....	Fr.	14	1065	3900	7	1⅞-4	2	S. G.	In.	Yes	136
137	9 x12	500	K	2 -Own	Own	none	Own	Own	Sl. G.	20	500	.....	1	1½-3	2¼	G.	.....	No	137
138	4¼x 5½	800	G-K	1 -King.	Ben.	Dixie	Own	.....	Fr.	12	700	2200	7	1-4	2¼	S. G.	Op.	Yes	138
139	4½x 6¾	750	G-K	1⅜-King.	Ben.	Dixie	Own	.....	Fr.	14	600	2200	7	1-4	2¼	S. G.	Op.	Yes	139
140	4 x 6	900	K	1½-King.	.....	King.	.....	.....	.....	18	600	2828	2	2-3	2½	Ch.	Op.	.....	140
141	4½x 5¾	1000	K	1¼-King.	Ben.	Bosch	Own	Cotta	Sl. G.	12½	915	3000	3	1½-3¾	2¼	S. G.	Op.	.....	141
142	4½x 6¾	950	K	1¼-King.	Ben.	Dixie	Own	Cotta	Sl. G.	12½	810	2850	3	1½-3¾	2¼	S. G.	Op.	.....	142
143	5½x 7	825	K	1½-King	Ben.	Dixie	Own	Own	Sl. G.	12½	840	2749	2	2.4-3¾	2.4	S. G.	Op.	.....	143
144	8 x10	525	K	2 -King.	Ben.	Bosch	Own	Own	Sl. G.	24	525	3310	2	2-4½	2	S. G.	Op.	.....	144
145	3½x 5¼	1050	G	1 -Ben.	Ben.	Dixie	B. & B.	Own	.....	12	890	2800	2	2½-4½	2½	R. P.	In.	Yes	145
146	4 x 6	900	K	.....	Ben.	Dixie	.....	.....	.....	.....	900	.....	2	2-3½	2½	Ch.	Op.	No	146
147	5 x 6½	850	G-K	1½-Strom.	Ben.	Dixie	Own	.....	.....	12	850	1838	2	2-2½	2	S. G.	In.	Yes	147
148	4¾x 6	950	K	1¼-King.	Own	Dixie	Own	.....	.....	12½	1200	3900	1	.....	2-3½	S. G.	In.	Yes	148
149	4¾x 6¾	900	G	King.	Ben.	Eise.	B. & B.	Own	.....	12	.....	2700	3	1¼-2½	2⅜	G.	In.	.....	149
150	3¾x 5¼	1000	K	1¼-King.	Ben.	Dixie	Own	Foote	Sel. G.	14	600	2200	2	1½-3	1¾-2½	R. P.	Op.	Yes	150
151	4½x 5½	1000	K	1¼-King.	Ben.	Dixie	Own	Foote	Sel. G.	14	600	2030	2	1½-3	1¾-2½	R. P.	Op.	Yes	151
152	5½x 6½	850	G	.....	Ben.	.....	.....	.....	.....	12	900	.....	2	2⅛-2¾	.....	G.	In.	Yes	152
153	4½x 6	900	K	.....	Ben.	.....	.....	.....	.....	12½	1000	.....	2	2¼-5	.....	G.	In.	Yes	153
154	4¼x 5¾	900	G-K	1¼-Ben.	Ben.	K-W	Own	Own	Sel. G.	18	433	2030	2	2½-3½	2⅛	S. G.	In.	Yes	154
155	6½x 7	750	K	1½-Scheb.	Own	Dixie	Own	.....	Sl. G.	14	750	2750	2	2¼-3	2¼	S. G.	Op.	Yes	155
156	5 x 6½	750	G	1¼-King.	Ben.	A-K	Pier.	Own	Sl. G.	12	750	2358	1	2¼	2¼	R. P.	In.	Yes	156
157	5 x 6½	800	K	1½-Strom.	Ben.	Eise.	B. & B.	Foote	Sl. G.	16	575	2660	2	1¾-4	2 ½	S. G.	Op.	Yes	157
158	4½x 6¾	700	D	1¼-Ens.	Donal.	Bosch	B. & B.	Own	Sl. G.	12	700	2200	3	1.5-4	2.08	.....	.....	No.	158
159	5¼x 7	700	D	1½-Strom.	Donal.	Bosch	.....	Own	Sl. G.	Opt.	700	.....	2	2.06-3.28	2.06	.....	.....	No	159
160	4½x 5½	900	K	1¼-Car.	.....	.....	.....	.....	Sel. G.	12	800	2500	4	1-5	2½	S. G.	In.	No	160

matic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter; Perr., Perrin-Ingram. **Air Cleaner**—Donal., Donaldson; Ben., Bennett; Holl., Holley. **Magneto**—A-K. **B**, Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., sliding jaw clutch. **Final drive**—S. G.,

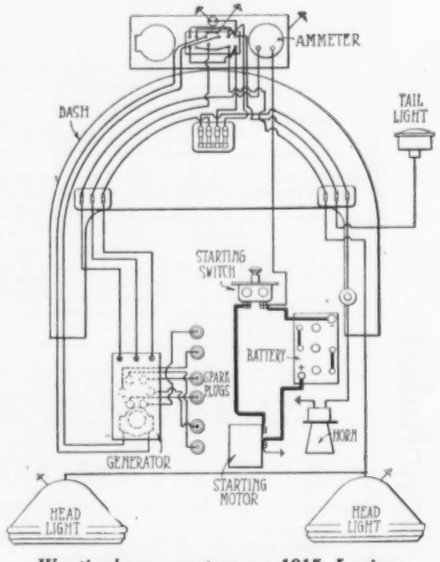
Motor Age Wiring Diagram Chart No. 25



Bosch dual ignition system on 1913 *Alco*



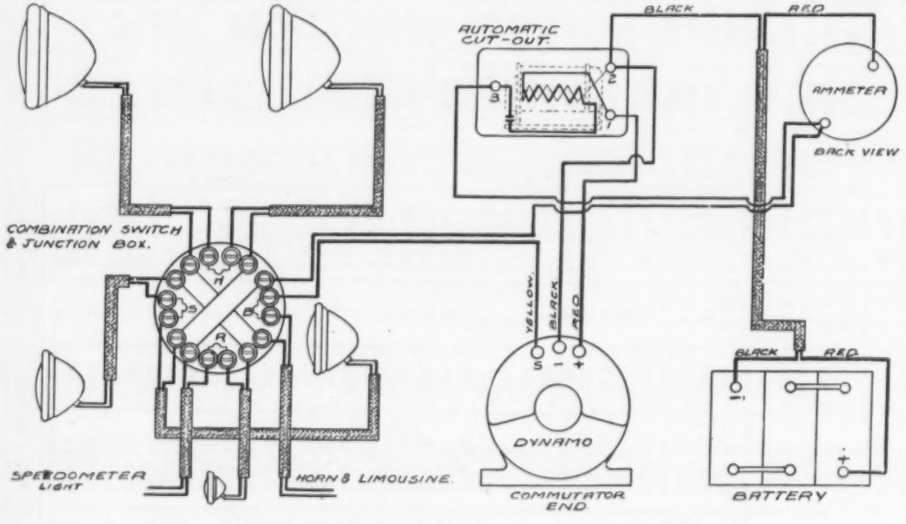
Method of connecting spotlight on 1916 *Velie*



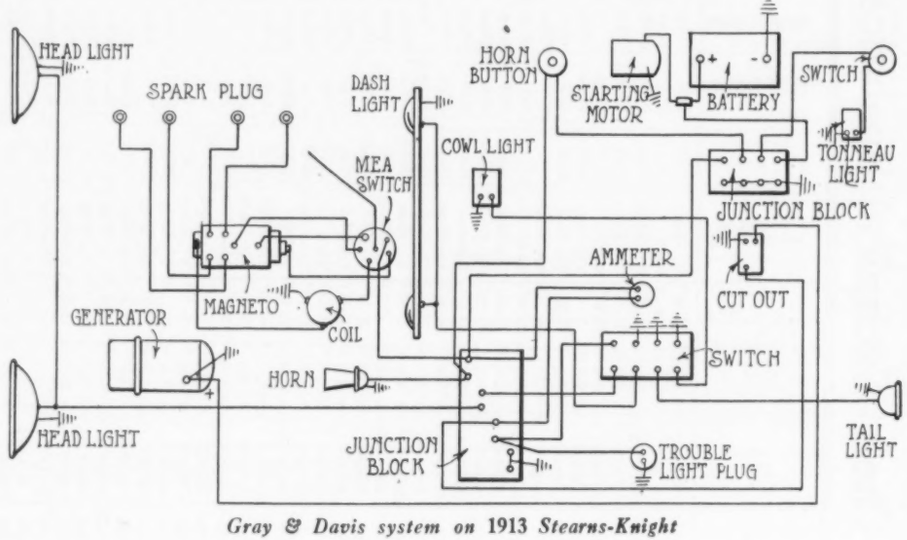
Westinghouse system on 1915 *Lexington-Howard six-cylinder*

Abbott—March 20-27
Alter—Nov. 14
Apperson—March 6
Buick—Nov. 21-April 3
Cadillac—Dec. 9
Cole—Jan. 23-April 3
Case—Feb. 27
Chalmers—Feb. 20
Chandler—April 3
Chevrolet—Nov. 28-March 27
Detroiter—March 6
Dodge—Dec. 12
Dort—March 13
Elgin—Feb. 27
Empire—March 13
Ford—Jan. 30
Grant—Feb. 27-March 27
Henderson—April 3
Hudson—Dec. 5
Hupmobile—Feb. 13
Interstate—March 13
Krit—Feb. 6
Little—March 20
Locomobile—Jan. 23-April 17
Marion—March 6-20
Maxwell—Jan. 16
Mercer—Jan. 23
Michigan—March 20
Mitchell—Jan. 9
Oakland—Jan. 2
Oldsmobile—Jan. 23
Overland—Nov. 7-14
Premier—April 10
Pullman—April 10
Regal—Feb. 6; April 10
Reo—Feb. 27
Saxon—April 17
Simplex—April 17
Scripps-Booth—Dec. 26
Studebaker—Dec. 26

This Week:
Alco—Lexington—Stearns—Velie



Gray & Davis starting and lighting system on the 1913 *Alco*



Gray & Davis system on 1913 *Stearns-Knight*

Sizes of Brake Linings for Cars

Motor Age Maintenance Data Sheet No. 35

One of a series of weekly pages of information valuable to service man and dealer—Save this page

1914 Models

Car and Model—	INTERNAL Length	INTERNAL Width	INTERNAL Thickness	EXTERNAL Length	EXTERNAL Width	EXTERNAL Thickness
Austin—77	45	2½	¼	45	2½	¼
Briscoe—B-15	24	1¼	3/16	35	1¼	3/16
Buick—B-24, 25, 36, 37, 54, 55	49	2⅜	3/16	46½	1⅝	3/16
Cadillac	54	2½	3/16	51	2½	3/16
Cartercar—5	42⅞	1 5/16	3/16	41¼	1⅝	3/16
Chadwick	44	2	3/16	42	2	3/16
Chadwick—19	44	2 3/16	...	42	2	3/16
Case—S	42 5/16	1⅞	5/32	40 9/16	1⅝	5/32
Case—R	37¼	1⅞	5/32	35 5/16	1⅜	5/32
Case—O	48¾	2½	3/16	45⅜	2½	3/16
Chalmers—24	50¼	2 3/16	3/16	48¼	1 13/16	3/16
Chalmers—26-A	43½	2 3/16	3/16	41¾	1 15/16	3/16
Chandler—All	...	...	...	15	1¾	5/32
Crawford—All	41	2	3/16	41	2	3/16
Cunningham—R	53½	2½	3/16	49	2½	3/16
Davis—6-50	49	2⅜	7/32	48	1⅝	3/16
Davis—35J, 35K	37¼	1⅞	5/32	35 5/16	1⅜	5/32
Dodge—All	42¾	2¼	3/16	34 3/16	2	3/16
Dorris—I	43½	2½	3/16	40	2½	3/16
E-M-F—All	36½	1⅞	3/16	36½	1⅞	3/16
Empire—33	37	2	3/16	36	1½	3/16
Fiat—All	22	2½	¼	20	2	¼
*Ford—T	23⅜	1⅛	5/32	No lining		
Franklin—Series 5	35 1/16	2⅝	5/32	...	...	...
	23⅞	4	3/16	...	...	...
Glide—All	40½	2	5/32	...	...	...
	15½	2	⅛	...	...	...
Haynes—26 & 27	50	2½	3/16	48	2½	3/16
†Haynes—28				17½	2	5/32
				12	2	5/32
Hudson—54	50⅝	2 3/16	3/16	48⅝	1 15/16	3/16
Hudson—6-40	44⅜	2 3/16	3/16	42⅜	1 13/16	3/16
Hupmobile—HA	36 3/16	2	5/32	31 7/16	2	5/32
Interstate—45	39	2	3/16	37	2	3/16
Jackson—33	45⅝	2	3/16	42¾	1¾	5/32
*Jeffery—All	40 1/16	2	3/16	...	...	...
	20 7/16	2½	3/16	...	...	...
King—B	41	2	5/32	38½	2	5/32
KisselKar—All	34⅜	4	3/16	38	3½	3/16
Klinekar—All	101	2	3/16	75	2¼	3/16
Krit—L & M	33	2	3/16	30	1½	3/16
Lenox—All	78	2	3/16	78	2	3/16
Lexington—4-H	...	...	...	15½	1¾	5/32
Locomobile—All	44 1/16	3	3/16	14 13/32	2	3/16
Lozier—30, 32 & 34	53½	2½	3/16	49	2½	3/16
Lyons-Knight—K	49¼	2½	3/16	...	...	...
Marmon—41	53½	2½	3/16	49	2½	3/16
Maxwell—25	34⅞	1½	3/16	17⅞	1½	3/16
McFarlan—All	51	2⅜	3/16	48	1⅞	3/16
Mercer—All	9½	3¾	3/16	19	2	3/16
Metz	...	...	...	24	1⅛	3/16
Mitchell—A	51½	2¼	3/16	47⅝	2	3/16
Moline-Knight—B	52	2⅜	3/16	52	1⅞	3/16
Moon—6-50	...	...	...	40	2	3/16
National—All	50¼	2	3/16	48¼	1 13/16	3/16
Oakland—36	37¼	1⅞	5/32	35	1⅝	5/32
Oakland—48	42 5/16	1⅞	5/32	40 9/16	1⅝	5/32
Oldsmobile—54	49	2⅜	3/16	46½	1⅝	3/16
Overland—79	41	2¼	3/16	10 3/16	2¼	3/16
Overland—65	41	2¼	3/16	13¼	2½	3/16
Packard—1-38	43	2⅜	¼	No lining		
Packard—3-48	29 5/32	2⅜	¼	No lining		
Packard—2-38	52	2⅜	¼	No lining		
Packard—4-48	53 5/64	2½	¼	47½	2½	¼
Paige—4-36	45⅝	2	5/32	42¾	1¾	5/32
Pathfinder	46⅞	2	3/16	34¼	2	3/16
Pathfinder—6-cyl	46⅞	2¼	3/16	34¼	2¼	3/16
Peerless	44	2¼	¼	...	...	...
Pierce-Arrow—6-66	20⅞	3¼	3/16	19	3	3/16
Pierce-Arrow—6-48	18¾	3¼	3/16	16⅞	3	3/16
Pierce-Arrow—6-36-38	15¼	3	3/16	13⅝	2¾	3/16
Premier—A	43⅜	2¾	3/16	14 13/16	2¾	3/16
Regal	31½	2	5/32	29¼	1¾	...
Reo—R & S	43	2	3/16	38 13/16	2	3/16
Stanley—710	32½	1¾	3/16	35½	1¾	3/16
Stearns—SK 4 & 6	24	2¼	¼	17¾	2¼	¼
Stevens-Duryea—D-6	...	...	...	14	2¼	¼
Studebaker—All	36 3/16	2	3/16	...	...	...
†Stutz—E				16½	1¾	5/32
				16½	1¾	5/32
Velie—9 & 10	43⅝	2½	3/16	39¾	2½	3/16
Velie—11	42 5/16	1⅝	5/32	40 3/16	1⅞	5/32
Westcott—O-30	33	2¼	3/16	...	...	...
Winton—20	44¼	3	5/32	42½	2½	5/32

1915 Models

Allen—34	35½	2	5/32	36½	1⅝	5/32
Alter—4-27	28 7/16	1⅝	5/32	27⅛	1⅝	5/32
Apperson—All	40	2¼	3/16	36½	2	3/16
Auburn—4-36	42½	1¼	3/16	...	...	...
Auburn—6-40	49	1½	3/16	...	...	...
Austin—66	42	3	¼	42	3	¼
†Biddle—C	...	...	...	42	2	5/32
				29	1¾	5/32
Briggs-Detroit	34 9/16	1¼	3/16	23 9/16	1¼	3/16
Briscoe—B-15	24	1¼	3/16	35	1¼	3/16
Buick—C-24, C-25	35 5/16	1⅜	5/32	37 7/16	1⅞	5/32
Buick—C-36, 37, 54	38⅛	1 5/16	3/16	35	1⅝	3/16
Cadillac—51	54	2½	3/16	51	2½	3/16
Case—R	40⅞	1⅞	5/32	40⅛	1⅝	5/32
Chadwick—19	44	2 3/16	...	42	2	3/16
Chalmers—26-B	43½	2 3/16	3/16	41¾	1 15/16	3/16
Chalmers—29	50¼	2 3/16	3/16	48¼	1 13/16	3/16
Chalmers—32-A	37 11/16	2 3/16	3/16	34¾	1 15/16	3/16
Chandler—16B	...	...	...	15	1¾	5/32
Chevrolet—490	27½	1¼	5/32	26½	1¼	5/32
Chevrolet—H-4	35 1/16	1⅝	5/32	35	1⅝	5/32
Crawford—6-35	41	2	3/16	41	2	3/16
Cunningham—S	53½	2½	3/16	49	2½	3/16
Davis—38, A, B & C	37¼	1⅞	5/32	35 5/16	1⅜	5/32
Dispatch	...	...	...	20	1½	¼
Dodge—All	42¾	2¼	3/16	34 3/16	2	3/16
Dorris—All	43½	2½	3/16	40	2½	3/16
Dort—5	27⅛	1⅝	5/32	28 21/32	1⅝	5/32
Empire—40	37	2	3/16	36	1½	3/16
Fiat—55 & 56	22	2½	¼	20	2	¼
*Ford—T	23⅜	1⅛	5/32	No lining		
*Franklin—All	35 1/16	2⅝	5/32	...	...	...
	24	4	3/16	...	...	...
Glide	40½	2	5/32	...	...	...
	15½	2	⅛	...	...	...
Grant—T	34	1¾	5/32	31	1¾	5/32
Haynes—30	...	...	...	15½	1¾	5/32
Haynes—31	50	2½	3/16	48	2½	3/16
†Haynes—32				17½	2	5/32
				12	2	5/32
Hollier—All	37 1/16	1½	3/16	23 9/16	1½	3/16
Hudson—6-40	44⅛	2	3/16	40⅝	2	3/16
Hudson—54	50⅝	2 3/16	3/16	48⅝	2	3/16
Hupmobile—K	41¼	2	5/32	39⅞	2	5/32

*Transmission brake.

†Both brakes internal.

Gray & Davis starting and lighting system on the 1913 Alco

Left to right—Double-decker selling for $1,430, made with attachments A, B, C, E and H; carryall type selling for $1,455, made of attachments A, B, C, E and I; top box, grain-tight type selling for $1,430, made of attachments A, B, D, E and F

Body Attachments for Reo Speed Wagon

Designed to Meet Demands of Varying Class of Trade

THE Reo Motor Car Co., Lansing, Mich., has brought out a set of body attachments applicable to its speed-wagon to meet the demands of the varying class of trade.

The basic body is an express body. On this can be put the various attachments to build the body up in a variety of forms. The chassis and attachments are lettered as a key, the following being a list of the key letters together with price:

(A) Chassis, $1,250.
(B) Express body and seat, $100.
(C) Canopy top, $50.
(D) Cab and curtains, $30.
(E) Windshield, $20.
(F) Grain-tight top box with end gate, $30.
(G) Stock rack sides, $15.
(H) Grocer's side rails and rack, $10.
(I) Seats and back rest, $35.
(J) Bows and khaki top, $50.

Different Combinations

Different types of combinations can be made with these attachments. For instance, with chassis and attachments A, B, C, E and H a double decker, grocer's or truck gardener's van, can be made to sell for $1,430. A hog or sheep rack wagon can be made up for $1,415 by using attachments A, B, D, E and G. To make up a top box, graintight wagon selling for $1,430, attachments A, B, D, E and F would be used. This gives a dump type of body suitable for handling grain. The body is not a tilting type, but all that is necessary to do to dump it is to drive on the scales, weigh the grain, lock the brakes, place the hook under the front axle and with the simple hand hoist raise the front end of the truck for dumping.

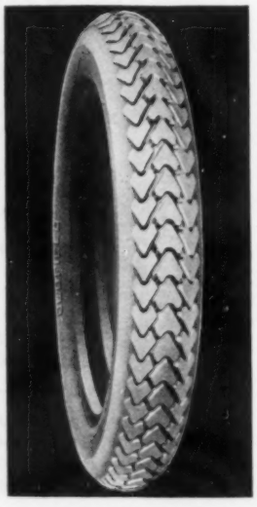
It has been found that 50 per cent of the purchasers of trucks bought the stripped chassis, although a body which was very good from a general standpoint was supplied with the truck. The convertible body was studied but found to be rather complicated, so it was decided to provide a set of attachments by which the purchaser could select what attachments he desired and build up any sort of necessary body.

A great variety of other bodies can be built up, such as the carryall made out of attachments A, B, C, E and I, or an army type or schooner made out of attachments A, B, E and J, or a canopy top express made out of attachments A, B, C and E, or an express with driver's cab made out of A, B, D and E, and various other combinations are readily made up. The price can be taken from the list given.

The attachments are featured by the Reo grip lock, which does not depend on wood attachment and thus avoids swelling and shrinking. This is a metallic grip with a thumb screw or wing nut to clamp the stake in place.

New Oldfield Tire

THE Oldfield Tire Co., Cleveland, Ohio, of which Barney Oldfield is president, already is making carload shipments of the Oldfield tire, which is made as a fabric tire and as a cord, each being made by a two-cure process, in which the tread is wrapped. The heat of the second curing process shrinks the wrapping so the outer tread and the inner carcass are held firmly together through the knitting, or binder, material between the two. The outer tread compound is zinc tempered, which it is claimed adds elasticity and toughness to the rubber.



Oldfield tire

The anti-skid type has a distinctive marking. Three rows of arrow heads, each row pointing in an opposite direction to the adjacent row, forms a tread designed to offer positive resistance to slipping. The fabric and cord treads are made in all sizes, and the tubes are furnished in either red or gray.

The company is building up a large distributer organization. One factory branch is maintained, the Oldfield Tire Co., Los Angeles, Cal., which Mr. Oldfield established several years ago.

AIR CONTEST IN FRANCE

Paris, March 15—By mail—A big airplane engine competition will be organized by the French government next year. It has been decided that there will be three types of engines:

125 to 150 hp.
250 to 300 hp.
500 to 600 hp.

Each engine will have to run 300 consecutive hours at eight-tenths of the maximum power. The maximum weight for the complete engine with water, gasoline and oil for 5 hr. running is 6.6 lb. Propeller speed is limited to 800 r. p. m. It has been decided that to allow present engines to compete they can be used with geared-down propellers, to obtain the limited number of 800 r. p. m.

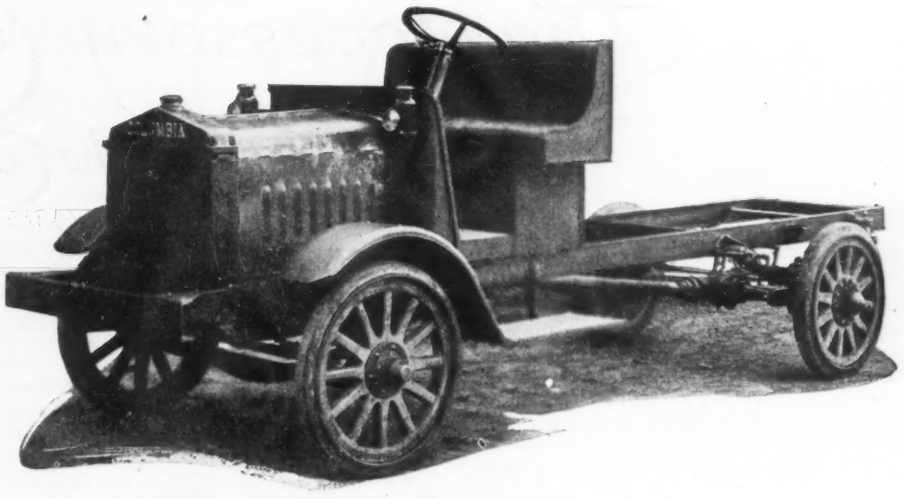
In addition to this, there will be a big competition on a fixed date during the year 1920.

Columbia 1-Ton Truck

Will Be Sold in Chassis Form—Distinguished by Low Weight

Wheelbase Length Is 126 and 96 Inches

A NEW 1-ton truck is being put into production by the Columbia Motor Truck & Trailer Co., Pontiac, Mich. The truck is sold in chassis form and is distinguished by its low weight. It is made up of standard units. The chassis is provided in two wheelbase lengths—126 in. and 96 in. The loading space is distributed so that 80 per cent is carried by the rear wheels, and on the 126-in. wheelbase chassis there is 10 ft. of load space behind the seat. The tread is standard, 56 in.



Columbia 1-ton truck, which comes in two chassis lengths

Continental Engine

The engine employed is the Continental 3¾ by 5 in., rated at 35 hp. It is provided with Dixie magneto and Shakespeare carbureter. The governor is a Pierce, built in as part of the engine and locked to govern at 18 m.p.h. Cooling is assisted by a long built-up radiator having a cast top and bottom so arranged that the core can be replaced. The radiator is spring-mounted and protected by an extension of the frame.

The drive is taken through a dry-disk clutch and the Covert gearset. The universal joints are Spicer tubular type, and the rear axle is a Russel internal gear drive.

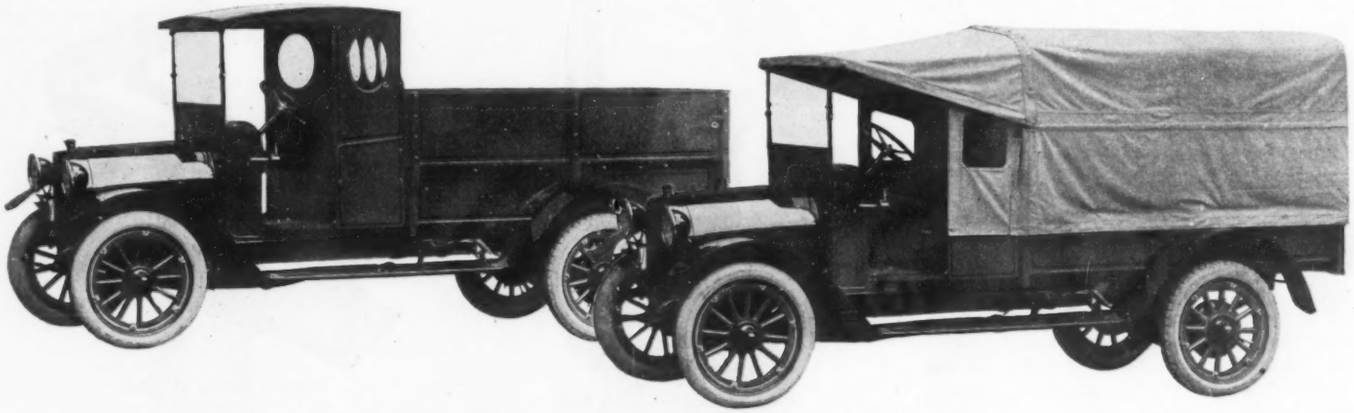
Frame construction is quite heavy for the weight and is a product of the Columbia factory. The front axle is an I-beam forging, mounted on Timken roller bearings. The wheels are 32 in. standard S. A. E. type and are made by the Hayes company.

Solid tires are regular equipment, but pneumatics can be furnished extra at $185. The tires are 34 by 3½ in. front, and 34 by 4 in. rear. The service brakes are external contracting, the drum diameter being 16 in. and the face width 2½ in. The hand brakes are internal expanding, both sets operating on the rear wheels.

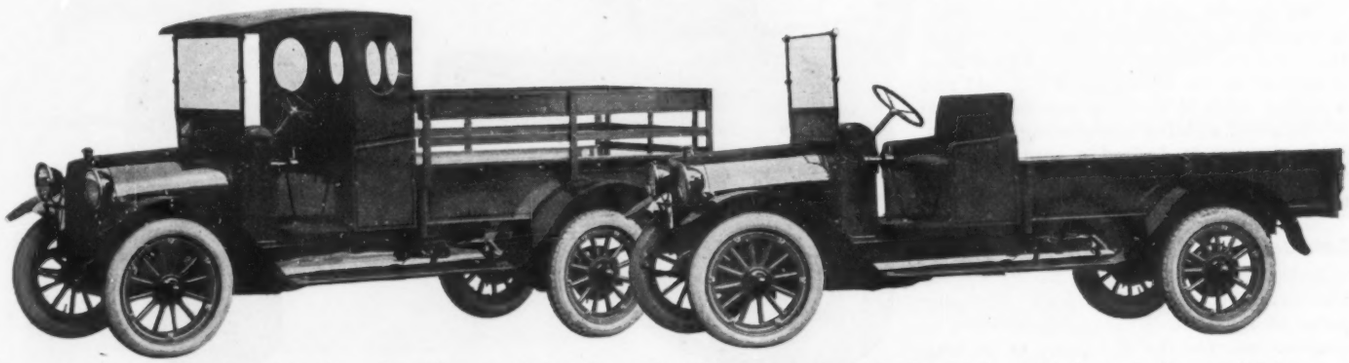
Springs are produced by the Perfection Spring Division of the Standard Parts Co. and are high carbon steel with bronze bushings. The steering gear is the worm and wheel type, with ball thrust bearings operated by an 18-in. hand wheel. The steering is on the left side, with the control levers in the center.

Chassis Equipment

Open seat cushion, lazy back, three oil lamps, set of tools, foot accelerater and jack are the chassis equipment. The Columbia company can furnish any type of body desired to meet the requirements of the business for which the truck is to be used; or, if desired, a cab complete with curtains and windshield will be furnished.



Left, side view of top box, grain-tight type, which sells for $1,430; right, Army type or schooner form of body selling for $1,420, made of attachments A, B, E and J



Left, express with driver's cab selling for $1,400, made of attachments A, B, D and E; right, basic body on which other Reo speed-wagon combinations are mounted. This is an express type selling for $1,350

The Accessory Corner

New Fitments for the Car

S. & N. Compression Plug

THE S. & N. compression plug screws into the spark plug hole, and a tire gage attached to the exposed end gives the compression when the engine is turned over. This is a practical accessory and is valuable to the motorist as well as the garage mechanic, for he generally carries with him a tire gage. It is manufactured by the S. & N. Compression Plug Co., Boston, Mass.

Brake Lining for Fords

The Hipco Co., Boston, Mass., is offering a transmission brake lining made of cork for the wearing surface. This is backed by a leather support for the cork, and then a steel band surrounds the whole. The cork facing is made of highly compressed cork, so that its wearing qualities are claimed to be exceptionally good. When the leather is worn the brake will continue to operate on the leather surface.

Fracto Kloth

Fracto is a chemically-treated cloth which leaves on the windshield an invisible coating that sheds water. The cloth is used after the glass surface is cleaned and while it still is slightly damp. The cloth resembles chamois in texture, is chemically treated and sells for 50 cents. It is manufactured by the Davis Chemical Co., Brockton, Mass.

Worm Drive Jack

The Benedict jack is a new one and has several good features. The base of the jack has three adjustments for height, which are made by raising the base of the jack and slipping in a pin. Then the head of the jack is raised by turning the long handle. The jack is worm driven and is provided with a quick release lever so that the disadvantage of the worm is overcome. The long handle makes it easier to place under the car and remove. It is made by the National Machine Co., Brattleboro, Vt., and sells for $8.

Gabriel Windshield Cleaner

The Gabriel Mfg. Co., Cleveland, Ohio, is making a windshield cleaner that is of the "pull the string" variety. The cleaner is applied to the top of the windshield and a spring holds it flush up against the top of the metal molding surrounding the glass. When its use is desired a cord is pulled which revolves the cleaner about the hinge, as shown in the illustration.

Low Gear Lock

H. W. Sanders, Rochester, N. H., is manufacturing a device that holds the gear pedal of the Ford in low. When there is constant use for the low gear, as in long heavy pulls through sand, this contrivance will hold the pedal in the low position, relieving the operator of the necessity of holding the pedal down himself. To release the lock the hand lever on the steering gear is tripped and the pedal then can be allowed to come out into high gear.

Burgess Shock Absorber

The Burgess shock absorber is designed to reduce the rebound action of the springs as well as the road shock. A special feature of the shock absorbers is the elimination of metallic contact between the springs and the axles, by the insertion of a rubber washer on the top of the coil of the spring. This rubber washer takes the direct force of the shock and transmits it to the coil spring. The Burgess rebound check and shock absorber is distributed through the Zinke Co., Chicago.

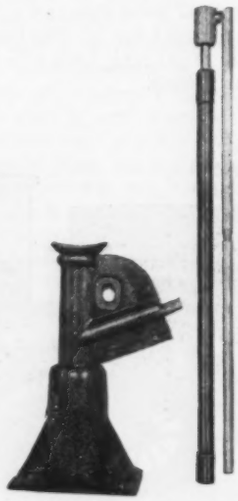
Automatic Oil Indicator

An oil indicator for Fords that blows the horn when the oil level becomes dangerously low is made by the Handy Mfg. Co., Grand Rapids, Mich. The device is attached to the bottom petcock on the rear end of the engine. Then the electric circuit is completed by connecting the wire from the indicator to the left side of the horn.

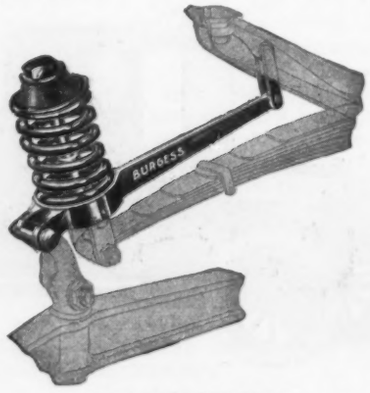
Springless Shock Absorbers

A new springless shock absorber is being made by the Starkweather-Snook Corp., Fort Madison, Iowa. There are no air rebound dashpots, no friction device, nor any working parts that tend to give a checking action through springs. It is claimed the rebound is absorbed by the roller which gives another supporting point for the spring and flexes the leaves at their ends. The absorbers can be applied to any type of spring, and at either end.

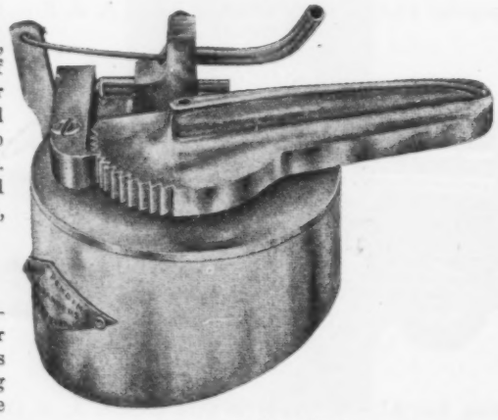
Gabriel windshield cleaner



Benedict jack, which is ball bearing



Burgess shock absorber



Low gear lock for Fords

S. & N. compression plug

Service Equipment

Time Savers of the Shop

Bearing Mender for Fords

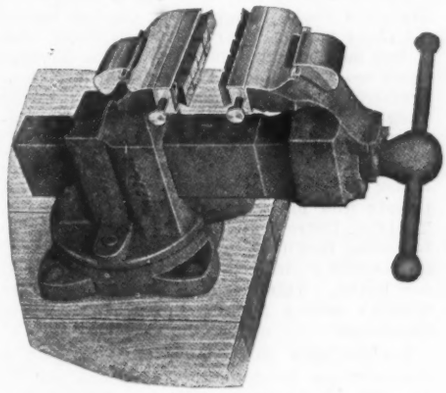
THE babbitting jig and the main bearing boring machine shown are for use on Ford and Fordson engine blocks. The maker, Henpy-Cooper Mfg. Co., Kansas City, Mo., claims that with the aid of one of these machines a skilled man can cast the main bearings and then rebore them in 45 min.

Silent Salesman for Plugs

The Twin Fire Spark Plug Co., Detroit, has brought out a silent salesman to aid dealers in disposing of plugs. This counter demonstrator, which consists of a vibrator coil—mahogany finished box—fixtures and wiring, is furnished to dealers at $3.70, which is less than actual cost. Any time it is returned the company refunds the purchase price. The demonstrator enables the salesman to show the customers the lead pencil test at the accessory counter.

Dri-Kure Retreader

The Dri-Kure retreader made by the Western Vulcanizer Co., Chicago, has some features that are new and patented. This vulcanizer has been designed with the intention of getting away from the objectionable blistering and core mark effects that are so general with vulcanized tires. The illustration show the wooden blocks at the end of the mold. Wood, being a very poor conductor of heat, keeps the end of the cured section cool, but the pressure is applied at the ends as well as at the center of the core. A pressure of 3000 lb. is applied to the tire through a steel band and equalized over the tire surface with a sandbag. Another feature is the aluminum matrix which makes the ribbed tread. This matrix is fitted to the inside of the core just as an engine bearing is fitted. The matrix is hand-scraped from prussian blue impressions. This insures an even temperature over the entire surface.



Adjustable vise attachment

Universal Vise Jaw

The Universal vise attachment is a device that fits on a vise and permits the jaws of the vise to grip firmly any shaped material. Pipes, connecting rods, round bushings, in fact, any form is held by the self-adjusting jaws. It is manufactured by the Universal Equalizer Co., Cincinnati, Ohio.

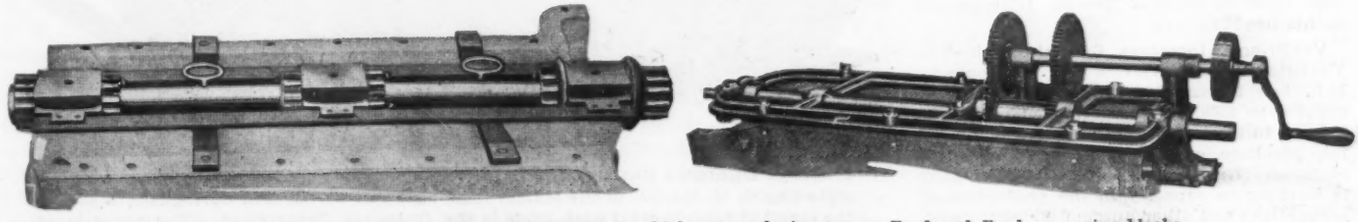
Portable Grease Gun

Ekern Brothers, Flandreau, S. D., are making a portable grease gun that is of much value to the shop's service equipment. With this grease gun a transmission or differential is filled very quickly and a record of the exact amount of oil or grease supplied can be read on the gage. The plunger is operated from a set of gears that can give two speeds, slow speed for heavy grease and high speed for oil and the lighter non-fluid oils. The gun is moved around at will on the large cast-iron wheels, and when refilling is necessary the head is swung to the side on a swivel which exposes the barrel of the cylinder. The gun is made in two sizes, models K and N K. The smaller model holds 20 lb. of grease or 2½ gal. of oil, and the larger model holds 56 lb. of grease or 7 gal. of oil. The prices are $47.50 and $65.

Portable grease gun, made by Ekern Brothers

Dri-Kure retreader, made by Western Vulcanizer Co.

Silent salesman for Twin Fire spark plugs



Babbitting jig and main bearing boring machine, which are made for use on Ford and Fordson engine blocks

Among the Makers and Dealers

Short Trade Notes

PACKARD Declares Dividend—Packard has declared a dividend of 2 per cent on the common capital stock of the company, payable April 30 to the holders of the common stock of record at the close of business April 15.

Berger Is Cleveland Stewart Manager—H. H. Burger has taken charge of the Stewart Products Co., Cleveland, Ohio, as manager. This company, which has been operated as a Stewart-Warner factory branch, has been changed to a service station.

Foundry Is Dated Up on Work—The Great Lakes Foundry Co., Port Huron, Mich., plans to increase its working force within the next six weeks so as to more than treble its present output. Contracts for making Ford tractor parts will keep the company running at capacity for months to come. A modern conveying system will be installed.

Company to Build $75,000 Garage—W. C. Wampler, Wampler Auto Co., Dayton, Ohio, will erect a four-story re-inforced concrete, brick-faced building costing $75,000. The building will be used as a garage and salesroom for the Wampler company, distributer of the Grant cars and Kelly trucks in that territory. It will have a capacity for 500 cars.

Simmons Takes on Nelson—The Simmons Co. has signed with Nelson to handle truck distribution in all New England states, New York, eastern Pennsylvania and the northern half of New Jersey. Its export territory includes central and southern Europe, all of Asia, British Isles, Norway, Sweden, Denmark, Mexico and eastern South America.

Saginaw Dealer Drives Away His Cars—Leo Demmer, Demmer Brothers Co., Saginaw, Mich., Chalmers-Maxwell distributer in that territory, drove away twenty-six new cars recently. The cars represented a part of the April allotment the company sold. The distance from Detroit to Saginaw is 110 miles, and in places the roads are none too good. He made the trip in 5 hr.

G. M. to Develop Michigan Crankshaft—General Motors will spend $100,000 at once developing the property of the Michigan Crankshaft Co., which it recently acquired. Eighty thousand dollars will be devoted to new equipment and the rest to building alteration designed to treble production. The extensions mean the employment of 200 as compared with the present force of eighty men.

District Manager for Nelson—C. W. Whitston, until recently sales manager of the Panhard Motor Truck Co., Grand Haven, Mich., has been made district sales manager for the Nelson Motor Truck Co., Saginaw, Mich. He will handle the southwest territory with headquarters in Los Angeles, Cal. J. F. Fernihough, formerly district representative for the Bethlehem Motor Truck Co. in the middle west, will be in charge of the northwest territory sales of Nelson. Chicago will be his headquarters.

VanBriggle Increases Capital Stock—The VanBriggle Motor Device Co., Indianapolis, Ind., has increased its capital stock from $300,000 to $500,000, the increased capital to be used in the erection of a modern plant and the purchase of additional equipment and material. The present plant of the company is working to capacity in the production of carbureters and other automotive equipment, and enlargement of the plant capacity is necessary to meet the demands for business. Pending the completion of the new plant, more room will be rented to provide for immediate increase of production.

Sincebaugh Leaves Remy Electric—C. K. Sincebaugh has severed his connection as sales engineer with the tractor equipment division of the Remy Electric Co. and is associated with the Rex Machine Co., Chicago, as general manager.

Standard Tool Moves to South Bend—The Standard Tool & Engineering Co. has moved its plant from Elkhart to South Bend, Ind. It has been working 100 per cent on Government work but soon will have its last Government orders completed and will swing back to the commercial production of automotive parts.

Dorr-Miller Buys Tool Concern—The Dorr-Miller Differential Co. has purchased the interests and plant of the Ward Machine & Tool Co., Detroit, and will increase its manufacturing facilities. A part of the plant will be devoted entirely to the special differential for Fords. This type is to be distributed through county agents who are now being appointed.

Porter-Cable Buys Lathe Company—The Porter-Cable Machine Co., Syracuse, N. Y., recently purchased the business of the Mulliner-Enlund Tool Co. and will move its entire equipment to its own plant, where it will continue the manufacture of the Mulliner tool room lathe in addition to the Porter-Cable lathe and accessories. Mulliner and Enlund will both be identified with the Porter-Cable organization.

Pioneer Dealer 's Dead—W. S. Hathaway, pioneer dealer, died in Kansas City, Mo., April 3. He was the oldest dealer in the city in point of service, having started in business in 1902. He was the first man in Kansas City to handle the Buick, Maxwell, Chevrolet, Hupmobile, Detroit Electric, R & L electric and the Detroit. He was also the first president of the Kansas City Automobile Dealers' Association. He was sixty-two years old at the time of his death. Mr. Hathaway's business will be continued by his three sons, H. T., George L., and W. S. Hathaway, in cooperation with his brother, C. E. Hathaway.

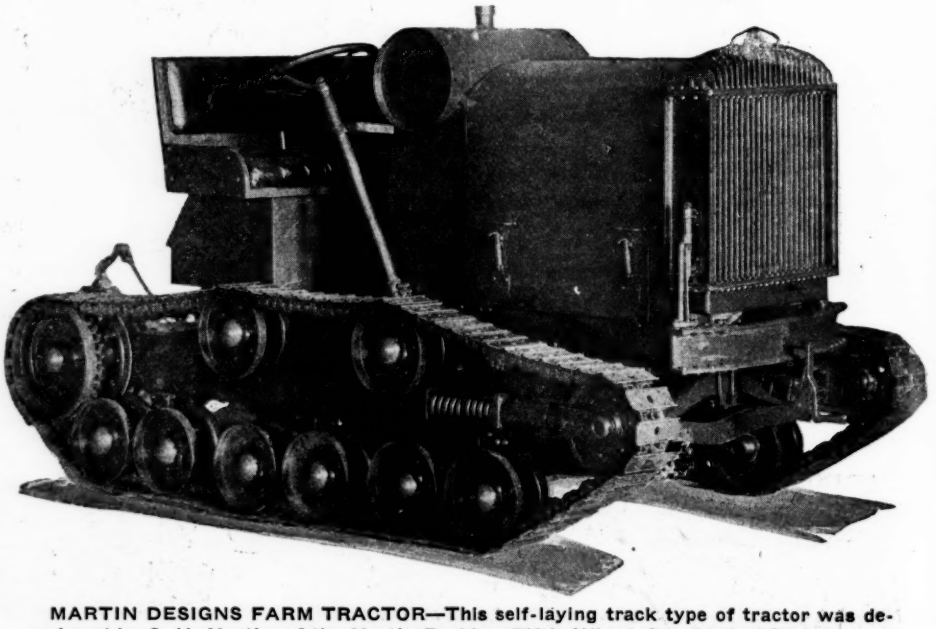
Duplex Adds Sales Engineers to Staff—V. N. Barton has been added to the sales engineering department of the Duplex Engine Governor Co. and will cover Pennsylvania and the southern states. R. Weston Doherty has a similar position covering New York, New Jersey and New England territories.

Willetts Is White Manager—C. C. Willetts, Davenport, Iowa, has been appointed manager of the Wisconsin district for the White Co., with headquarters at Milwaukee. Mr. Willetts succeeds Matthew C. Moore, who has resigned. Mr. Willetts has been associated with the White organization for twelve years.

Clyde Export Representative on Business Tour—To keep more closely in touch with foreign dealers and conditions in the Far East, P. W. Gaylor has left on a trip through that territory for the Clyde Cars Co. He will visit China, Japan, Siam, the Federated Malay States, Straits Settlements, Dutch East Indies, India, etc.

Jobber Drops Part of Name—Elyea Co., Atlanta, Ga., is the new name of the Elyea-Austell Co., jobber. The change in name presages no change in management. Mr. Austell has not been a stockholder in the company since 1916 and because of this his name has been dropped. The company is broadening its scope to cover the entire south Atlanta territory.

To Make Montana Tractor—John Hassler and Calvin Ulrich, Peru, Ill., have purchased a vacant building at Tinley Park and it will be utilized for manufacturing the machines of the Montana Tractor Co., recently organized at Peru. The tractor is a new type,



MARTIN DESIGNS FARM TRACTOR—This self-laying track type of tractor was designed by C. H. Martin, of the Martin Rocking Fifth Wheel Co., Springfield, Mass., as the result of experimental work while in the Ordnance Department. The tread is of pressed steel. The tractor is a three-plow

which is said to have many advantages over some of the machines now on the market. It is hoped to commence operations about May 1.

Star Rubber Opens New Branches—The Star Rubber Co. has opened new branches in Atlanta and Kansas City. L. G. Darling and R. J. Delavan are in charge respectively.

Firestone Establishes Erie Branch—The Firestone Tire & Rubber Co. has established a branch at Erie, Pa. N. N. Schmitz, formerly of the Buffalo, N. Y., Firestone agency, is in charge.

Ramler to Distribute Mason Tires—The Curtis Rubber Co., Milwaukee, Wis., formerly wholesale and retail dealer in Curtis and Carlisle tires, has changed its name to Ramler Rubber Co. The company is now distributer of Mason tires. Frank J. Ramler is president and general manager.

AC Team Is Inter-Factory Champions—The AC Sparks, representatives of the Champion Ignition Co., captured the championship of the Flint, Mich., inter-factory basketball league this year without the loss of a single game. The championship five defeated teams from large organizations such as Buick, Chevrolet and Dort.

Federal Opens Export Offices—G. H. Hamilton has been appointed manager of the new export department of the Federal Rubber Co., Cudahy, Wis., which has been established with headquarters at the Federal company's eastern headquarters in New York. The export business heretofore was handled through the general offices at Cudahy.

Eagle Founder Retires—Frank Saiberlich, president and founder of the Eagle Mfg. Co., Appleton, Wis., maker of farm tractors, gas engines, etc., has disposed of his interest and will retire. His brother, Oscar, also has sold his third interest, but Edward Saiberlich, secretary and treasurer, remains a stockholder and officer. The new interests are represented by August Knueppel, Nicholas Dohr and Matt Rossmeissl.

Parts Maker to Expand—The A. E. White Machine Works, Eau Claire, Wis., manufacturer of automotive parts, supplies and accessories, has completed plans for erecting a new plant, to be two stories high, 50 by 120 ft. The company is employing fifty men in night and day shifts. When the new plant is finished, the force will be increased to more than 100. The line of truck and tractor appliances will be enlarged to include several new designs.

La Crosse Appoints Distributers—The La Crosse Tractor Co. has established the following distributers: Farm Motor Sales Co., Mandan, N. D., southwestern North Dakota; Awtrey-La Crosse Tractor Co., Nashville, Tenn., eastern and central Tennessee; California Tractor & Implement Co., Sacramento, northern California; Knapp Tractor & Machinery Co., Los Angeles, southern California; Clymer Co., Henderson, all Kentucky; J. G. Matthews, Dallas, all Texas; Gasoline Engine & Tractor Co., Ltd., Winnipeg.

DEALER BUILDS ATTRACTIVE PLACE OF BUSINESS—This is the home of the A. M. Zimbrich Motor Co., Inc., Rochester, N. Y. It shows how attractive a dealer can make his plant

Borg & Beck in Chicago Office—The Borg & Beck Co., Moline, Ill., has established an executive and sales office in Chicago.

Tweedy Resigns from Young—O. S. Tweedy, vice-president and general manager of the L. A. Young Industries, Inc., has resigned, effective May 1. His future plans have not been announced.

Margell Now with LeRoi—C. H. Margell, formerly assistant general manager of the Monarch Governor Co., Detroit, has become associated with the LeRoi Co., Milwaukee, as assistant chief inspector of engines.

Schuyler to Run Accessory Department—H. P. Schuyler, for the last five years district sales manager for the American Ever Ready Works, has resigned to become manager of the accessory department of the Northern Electric Co., Minneapolis and Duluth, Minn.

Essenkay Will Expand Plant—The Essenkay Products Co., Chicago, will occupy a five-story building adjoining its present plant as soon as necessary repairs are made. Later the company expects to build a new plant. The five-story building contains 30,000 sq. ft. of floor space.

Vulcan Buys Battery Plant—The Vulcan Storage Battery Co., Brazil, Ind., has purchased the plant of the Brazil Stamping & Machinery Co., which has 60,000 sq. ft. of floor space. The construction of this building and its layout is such that it is specially suited for the manufacture of storage batteries. William Petschel will be in charge of production, which is expected to begin in about four weeks. The Liberty brand of storage batteries for all makes of cars will be manufactured.

Jordan Leaves Piedmont Car—N. M. Jordan, secretary and treasurer of the Piedmont Motor Car Co., Inc., Lynchburg, Va., has resigned to enter into the accessory business with headquarters in Lynchburg. He also will act as manufacturers' agent.

Korshin Joins Selden Truck—Matt R. Korshin, for several years district sales manager in the east for the Atterbury Motor Car Co., has been made western sales manager for the Selden Truck Sales Co., with headquarters in Chicago. Mr. Korshin succeeds A. R. Kroh, who has joined the Goodyear Tire & Rubber Co.

Takes Trailer for Fifty Counties—The Tollefsen Motor Co., Kearney, Neb., has taken on the line of Miami trailers for fifty counties.

Loeffel to Represent Hudson Specialties—J. G. Loeffel has been appointed representative of the Hudson Motor Specialties Co., Philadelphia, Pa., in Wisconsin, Iowa, Minnesota and Illinois.

Zeckendorf Heads Detroit Dealers—A. L. Zeckendorf, treasurer of the Detroit Automobile Dealers' Association for several years, has been elected president. He succeeds Walter J. Bomb. J. C. Ayers was re-elected vice-president; Guy O. Simons, secretary; and S. E. Cumstock, director. W. D. Block was chosen treasurer, succeeding Mr. Zeckendorf.

ST. LOUIS TRADE ELECTS

St. Louis, Mo., April 21—The St. Louis Automobile Manufacturers' and Dealers' Association has elected the following officers: President, Phil H. Brockman, De Luxe Automobile Co.; vice-president, H. F. Fahrenkrog, Mardell Motor Car Co.; treasurer, W. S. Roberts, J. I. Case T. M. Co.; directors, John Boe, St. Louis Motor Car Co.; H. G. Hurd, Buick Retail distributer; C. E. Lightfoot, G.M.C. Truck Co.; J. T. Salisbury, More Automobile Co.; Joseph A. Schlecht, Mound City Automobile Co.; George Weber, Weber Implement & Auto Co.

President Schlecht declined re-election. The annual meeting was addressed by J. D. Parker of the Federal Land Bank, who explained that the U. S. farm loans were appropriately applied when farmers got this money for buying automotive equipment for their farms. He explained in detail how such loans are made. F. W. A. Vesper, president of the N. A. D. A., and C. E. Lightfoot, who have been opposing what is known in this state as the "mud roads bill," asked a continued fight by the association. This request was complied with but the bill, which threatens to cut Missouri out of the Federal appropriation for roads, was signed by the governor Friday.

DENBY IS BACK HOME

Detroit, April 18—Maj. Edwin Denby, president of the Denby Motor Truck Co., late of the marines, has resumed his duties as head of his company after eighteen months' service. Two weeks after war was declared Major Denby enlisted.

NATIONAL TRACTOR CHANGES

Cedar Rapids, Mich., April 18—The National Tractor Co. has changed the name of its product from National to GO and is bringing out a new machine similar to its older model but equipped with a Waukesha 4½ by 5¾ engine.

TRUCK DEALERS ORGANIZE

Louisville, Ky., April 18—The Louisville Motor Truck Dealers' Association was organized this week at the office of the Southern Motors Co. Walter Dix, head of this concern's truck department, was elected president; Arthur C. Weber, Jacob Weber's Sons, vice-president; Ed Andriot, P. M. Andriot & Sons, secretary, and Chester P. Wilson, Chester P. Wilson Co., treasurer. Fifteen dealers and distributers were enrolled as members.

From the Four Winds

Glimpses at the World of Motordom

MUSKEGON Plans Automobile Club—The Muskegon chamber of commerce is promoting the organization of the Muskegon Automobile Club. Car owners are being solicited to join. The club will be made the active agency for the promotion of good roads work in Muskegon county.

Why Dealers Help Get Armory—The Erie Automobile Dealers' Association, Earle, Pa., has donated $1,000 toward a fund for the purchase of a site for a new state armory. When the building is complete it will be used to house the annual show which heretofore has been held in the U. S. garage, where the space has been too limited.

Ontario Headlight Law Status—No action has as yet been taken by the Ontario government to put into effect the law regulating headlights passed two years ago. This law has not been enforced because of technical difficulties, particularly for lack of a standard of glare. It is understood that the department of highways has given careful attention to this problem and that the standard will be defined. The regulation, somewhat modified, could then be put into effect. It has been intimated by W. A. McLean, deputy minister of highways for Ontario, that the anti-glare law, in a revised form, will be enforced in this province before many days. There may be an amendment which would give the government power to "limit or restrict the candlepower of any lighting device on motor vehicles."

Memorial Arch on Jefferson—Citizens of Winnipeg and St. Paul have joined in a movement to erect a memorial arch on the boundary of Manitoba and Minnesota in honor of the soldiers of the two states who gave their lives in the great war. When Britain day was celebrated in St. Paul last December a delegation attended from Winnipeg, and the project was broached as a means of further cementing the friendly relations between two nations. Unanimously approved by representatives of both cities, plans are now perfected by which the arch will be erected jointly by the St. Paul Association of Civics and Commerce and the Winnipeg Board of Trade. The spot will be on the Jefferson highway, at the boundary. This unanimity of feeling action between the two cities is regarded as a natural sequence of past events. When the Jefferson highway conference was held in New Orleans several years ago, Winnipeg sent a delegation which pledged completion of the highway from the boundary to that city. The pledge was fulfilled and the Jefferson highway in Canada is to-day an integral part of the system of Canadian highways.

Delaware Registration in January—The Delaware registration list for January shows a registration for that month of 11,946 cars, 380 motorcycles and 374 dealers, practically the same as the entire registration in 1918.

Traffic Cops Must Learn to Drive—Every Buffalo traffic officer must know how to run a car. An order requiring all traffic directors who are not at present skilled chauffeurs to take lessons and undergo tests showing their ability to drive a car through congested streets has just been issued. Each traffic officer will be given a test consisting of driving through Main street when it is most crowded.

Five Tractors for County's Roads—Stephenson county, Illinois, claims to lead in that state with public-owned tractors for road purposes. Five machines are now in service and are kept in constant use, grading and dragging the country highways. Experiments conducted last year were so successful it was decided to order five machines. Next year, it is expected that the number will be doubled as the great advantage over horses becomes demonstrated.

Cleveland Buying Cars Fast—More than 200 licenses a day are being issued at the Cleveland Automobile Club, which is a fair indication of the rapidity with which cars are being sold in the Cleveland district. The club is conducting a branch bureau for the state. This average is 20 per cent higher than the same period of former years. Altogether 48,000 sets of plates have been sold at the branch bureau. All last year only 61,000 cars were licensed from Cuyahoga county, so that after only two and one-half months the local registration is well within 20 per cent of last year's grand total for the county.

Roads Serve Mountainous Italy—Italy has 8,700 miles of broad-track railroad and 8,070 miles of roads over which a regular service is run to timetables. This big development of motor passenger carrying and good services is largely explained by the fact that Italy is a mountainous country in which railroads can only be built with difficulty. Most of the main railroad lines follow the coast, leaving the center of the country undeveloped. This defect has been remedied by the creation of motor lines which link up the railroads and penetrate in the mountainous district where railroad construction is costly.

Ohio Regulates Speed—Ohio has passed a bill providing for a state uniform speed regulation. Speed limits in business sections of municipalities is 15 m. p. h.; in residence districts, 20, and on the country highways, 25.

Roads in Ontario Are Provided For—Ontario has voted to set aside $5,000,000 for highways. It is expected that in all probability 200 miles of the provincial highway from Toronto to Windsor will be built of concrete, 175 of macadam, and the remainder of gravel. Construction will extend over a period of years. In addition the $5,000,000 includes some $1,800,000 to be paid counties for road systems. There are thirty-seven counties now under this scheme, and the average expenditure of each is $100,000 annually. The province provides 40 per cent of this.

Indiana Gets More License Fees—Use of cars in Indiana in 1919 already shows a big increase over 1918 in the first quarterly settlement of the secretary of state, with an increase of $335,953 in fees collected. In the first three months of 1918 fees collected totaled $839,621, and in the same period this year the settlement showed a total of $1,175,447. All the fees collected this year will be apportioned among the counties as formerly, but under the new highway commission law passed by the 1919 legislature license fees after Jan. 1, 1920, will go to the state highway commission.

But Worm Is an Awful Hard Word—It was the famous Bill Nye, late lamented humorist, who said "the public doesn't appreciate its notaries public; more should be done for them." But at last the notary worm has turned—in Philadelphia anyway. Notaries public in the Quaker City are presenting an almost solid front—and front is necessary to a notary public—against a motor license measure pending at Harrisburg. The bill eliminates notaries public, aldermen, magistrates and justices of the peace from executing applications for motor vehicle registration and provides for establishment of a motor vehicle license bureau and personnel, to be maintained by each county in the State. Should the bill become a law, the owner will be obliged to pay $1 for the registration of his application, which would take the place of the 50-cent fee now paid to the notary—hence the latter's perturbation.

Bay State Gathers Up Glass—The Bay State A. A. inaugurated a new stunt recently when it secured an Oldsmobile truck and started out for a week's work picking up broken glass from the streets of Boston as an object lesson to try to teach people to be careful. The truck had signs on the sides telling its object, and with the publicity many telephone calls were received from people who saw glass in the streets. In a week the truck picked up more than 200 lbs. of broken glass. A letter was sent to the mayor and to the police department calling attention to the carelessness and disregard of the city ordinances against leaving broken glass on the streets. The greater part of it was broken milk bottles left by drivers of wagons in their hurry making deliveries. Tire makers estimate that 25 per cent of tire cuts are made by broken glass, and this means the cost to motorists each year throughout the country runs into millions.

Coming Motor Events

SHOWS

Bristol, Va.	May 10-17

MEETINGS

Hot Springs, Va.	Automotive Equipment Association	June 2-6

RACES

Indianapolis, Ind.	May 31
New York	June 14
Cincinnati, Ohio	July 5
Uniontown, Pa.	July 19
New York	July 26
Elgin, Ill.	Aug. 22-23
New York	Aug. 23
Uniontown, Pa.	Sept. 1
New York	Sept. 20
Cincinnati, Ohio	Oct. 1